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ANGIOSCOTOMETRY.

JOHN N. EVANS, M.D., F.A.C.S.

BROOKLYN, N. Y.

The branching scotoma seemingly caused by shadow of the retinal vessels on the percipient layer can be mapped on the field of vision with the stereocampimeter with special test objects. After a review of observations reported in the literature the improved technic of this kind of examination is described with many illustrations of the charts obtained. Theoretic considerations bearing on the interpretation of these results are taken up, and a series of charts obtained in particular cases are reproduced and described. Read before the Ophthalmic Section of the New York Academy of Medicine, March 16, 1926.

It is proposed to present a report on an investigation of *the scotoma which the retinal vessels seem to project*, as an area of absolute blindness.

In submitting for consideration a problem so diverse in its aspects, a certain risk of misunderstanding cannot be avoided. It is, therefore, with some feeling of apprehension that the findings of these experiments are set forth, and it is earnestly requested that it be constantly borne in mind that all findings, while easily reproducible, must be considered as originating only from a very definite, yet simple, technic. It will, perhaps, be years before the physiologic explanations and diagnostic significance of changes to be described, are understood, so that no conclusions may be directly drawn at this time. Nevertheless, wonderful vistas unfold, which surely tempt at least some sort of speculation. It is hoped, therefore, that an attitude of critical analysis be adopted so that other factors may be brought out, not only for the furtherance of the present studies, but with the idea of elucidating such unsatisfactory problems as the etiology of glaucoma and the physiology of the retina.

In order to understand the significance of the vessel scotoma, particularly when interpreting the alterations found in pathologic conditions, it is necessary to analyze the blind spot of Mariotte. This is, perhaps, best done by considering an historical outline.

In 1668, Mariotte¹ discovered the blind spot, but made no attempt to study its form or size. Bernoulli², in 1728, plotted an elliptical figure the diameter of which

he calculated to be one-seventh that of the eye. In 1852, Donders³, supplied the first real proof that the blind spot corresponds to the nervehead, and tho Förster⁴ demonstrated the *papillomacular* bundle in 1876, thru his pathologic studies, it was not until 1882 that Samelsohn⁵ presented the real anatomic proof. Fuchs⁶ and Uhthoff⁷ have both presented evidence of the *peripapillary nerve fibers*, but leave their origin still in dispute. It was not until as late as 1915 and '16 that Gradle¹⁰ gave us dependable measurements on the blind spot.

A review of the literature develops very little material of value concerning the relation of the vessel scotoma in blind spot and other studies. Coccius⁸, in 1853, thought that this shadow might account for the formation of the blind spot of Mariotte.

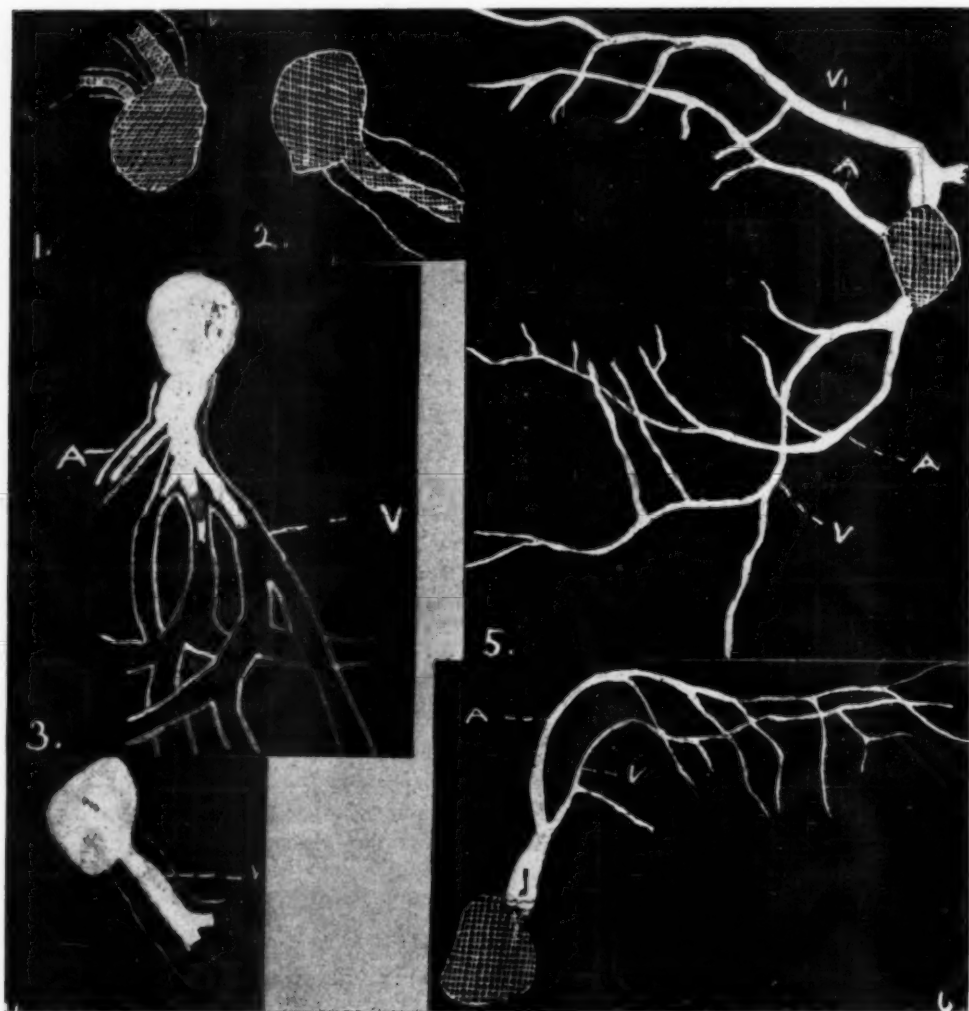
It is to be noted that Helmholtz says⁹, "The spot has the form of an irregular ellipse on which the writer can discern the beginnings of the larger blood vessels, as seen also by Hueck; the continuation of the vessels far in the fields will be found to be blind places." (He evidently considers it, therefore, an absolute scotoma).

Dr. Gradle¹⁰, in closing his very complete paper, makes the following reference to the influence of the vessels on the blind spot, "In a few intelligent patients, with great care, it is not difficult to plot off the course of the largest vessels (usually four in number) where they pass on to the perceiving retina. The blind areas resulting from these vessels are usually only relative, but they can be traced several centi-

meters away from the disc, but in making measurements no attention need be paid to them."

In 1918 Igersheimer¹¹ made the following statement: "I hold it as probable that there are small defects about the blind spot, produced by the larger retinal vessels. It is striking that we

stumps also lend an unwarranted air of discouragement to the problem.¹² Quoting him, he states, "In a small series of patients the technic of Igersheimer has been followed in an effort to determine in what percentage of cases it is possible to map out the course of the larger retinal vessels.



Figs. 1-6. Scotomas obtained under special conditions. 1. Pressure on globe shows only stumps of large vessels. 2. Holding the breath causes similar effect; also 3. Holding the head low. 4. Pressure on opposite eye widens arteries and still more veins. 5. Pressure on the carotid produces no definite effect. 6. Looking thru red glass brings out finer vessels. See p. 496.

do not succeed in obtaining the entire figure in the vicinity of the papilla instead of only getting some of these small defects."

The more recent efforts at study of the vessel scotoma by Marlow, tho showing the plotting of a few vessel

Igersheimer describes his method as perimetry perpendicular to the course of the nerve fibers.

After mapping out the limits of the blind spot the test object is carried about it in a circular manner at some distance (4-5 cm.) from it, and the ob-

server required to note whether or not it disappears momentarily or becomes less sharply defined in places. It is only after the encircling has been completed two or three times that the test object will disappear at places above and below the blind spot, corresponding to points from which the retinal

with the tangent screen at a distance of 1 M. As Hess has pointed out, a 2 mm. test object at this distance, subtends an angle less than half of that subtended by a large retinal vessel. Igersheimer believes these scotomata to be fatigue phenomena, and considers them to be physiologic."

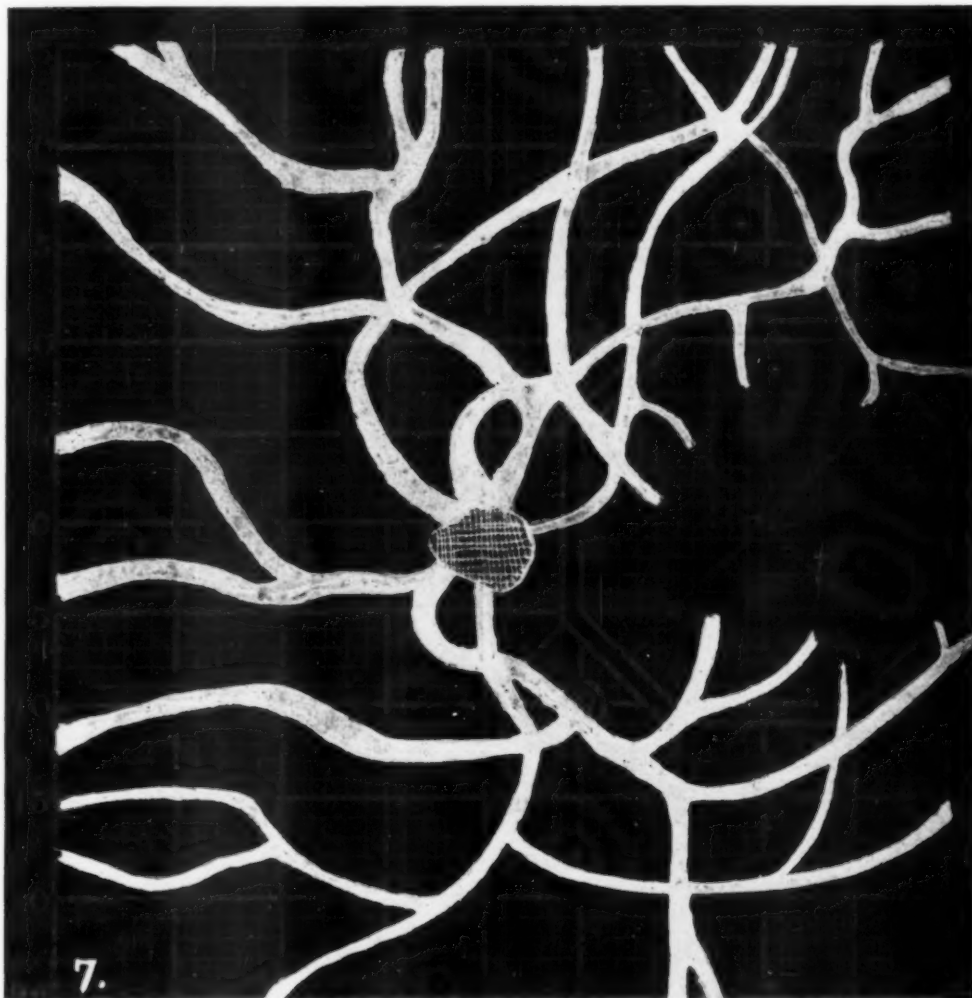


Fig. 7. Vascular scotoma showing fewer big branchings. 1 mm. white sphere used. Hyperopia 1D. Mapping time 2 hours. See p. 498.

vessels come off the disc. (Of thirty-four cases in which this procedure was carried out, it was possible to map out a scotoma corresponding to a large retinal vessel in eighteen cases. In nine cases such a scotoma was traceable in both eyes, in nine cases in one eye") "In looking for these scotomas a 2 mm. test object was used

Beyond these and a few similar unsatisfactory studies we have only the efforts to plot the vessel shadow as seen entopically. This method can have no place in the present problem, first, because it would be impossible to interpret the findings, if such could be discovered, as the results are entirely dependent on the subjects' descriptive

powers and secondly, because we can not tell exactly what particular small area of vascular tree is presenting.

A review of the present status of this aspect may be found in a paper by Ogden,¹³ in the *American Journal of Psychology*, April 1901. The American Translation of Helmholtz' Physio-

quote a number of workers and show charts.)

We have thus brought our review up to the time of the present studies.

In the fall of 1925, while outlining a blind spot on the Lloyd Stereo-Campimeter, a peculiar stellate form was brought out. When studying the

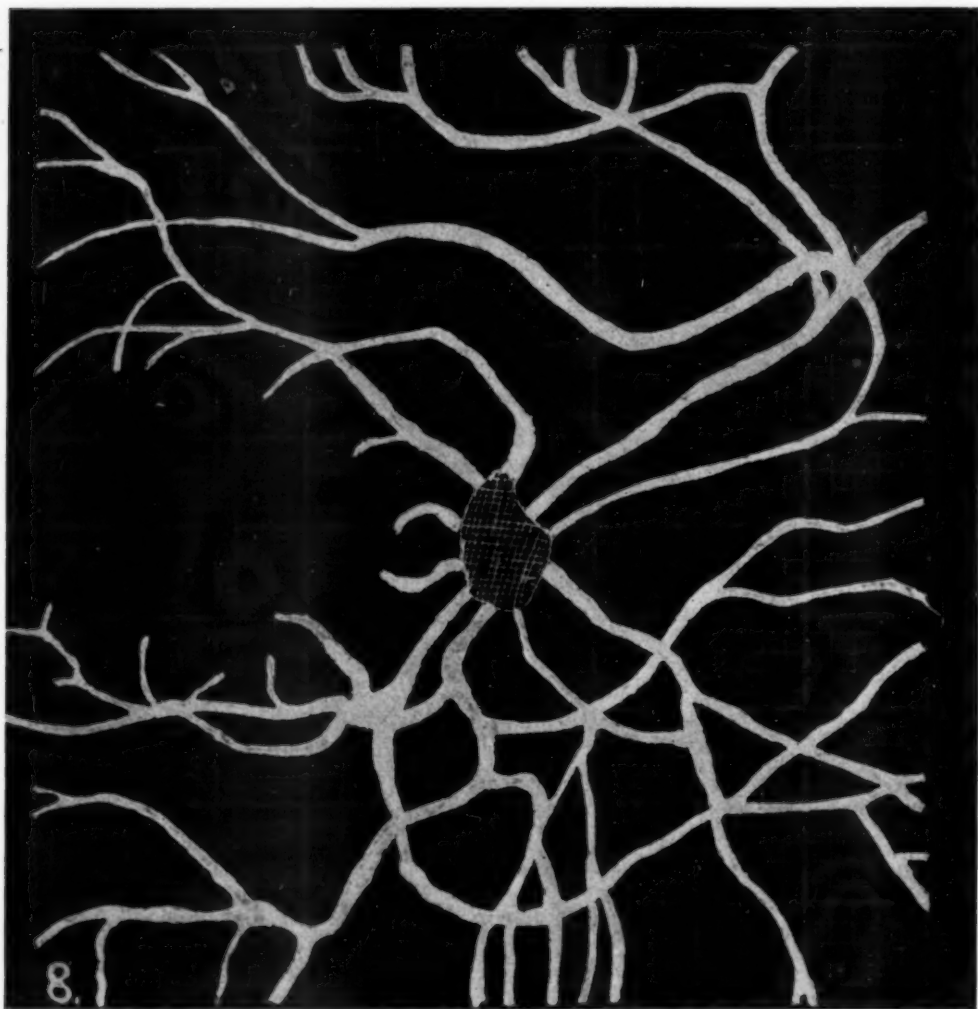


Fig. 8. Typical vascular scotoma. $1\frac{1}{2}$ mm. white disk used, emmetropic. Mapping time 1 hour and 30 minutes. See p. 498.

logical Optics gives a very delightful and instructive description also. Observers have shown charts in which there is a suggested relation between the vessel and a disease scotoma and have even discussed possibilities from an etiologic standpoint. Such observations, however, are too meager to be of value here. (Lloyd²⁵ and Peter²⁴

points of this figure in more detail it was noted that they could be followed to the very edge of the slate without the least difficulty and their character was suspected, as the dichotomous branching of the retinal vessel system unfolded itself. This impression was corroborated by the use of the ophthalmoscope. The patient was one who

happened to be suspected of a beginning chronic glaucoma, and so presented many interesting features for elucidation.

The first step to be taken was to establish the characteristics of the normal vessel scotoma, therefore forty

action) the muscle balance should be checked and corrected by the instrument. Monocular fixation is very satisfactory—a blinder covering the eye not in use. The monocular method was used in these studies.

4. The object used for much of this

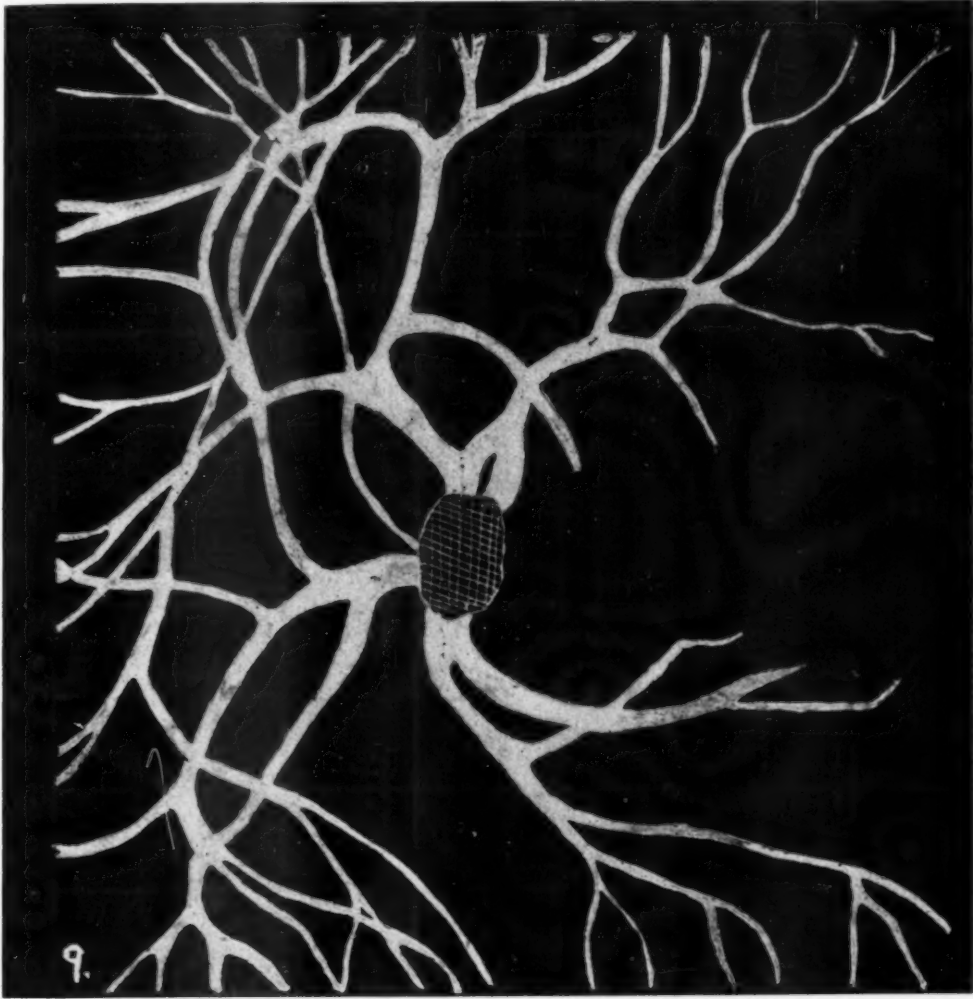


Fig. 9. Typical vessel scotoma, type showing many and frequent branchings. $1\frac{1}{2}$ mm. disk used, emmetropia. Mapping time 1 hour and 30 minutes. See p. 498.

eyes were mapped by the following technic:

1. It is understood the usual precautions for control of position, comfort, distractions, etc., are taken.

2. Distant correction should be worn.

3. The Stereo-Campimeter and Lloyd Chart are used.

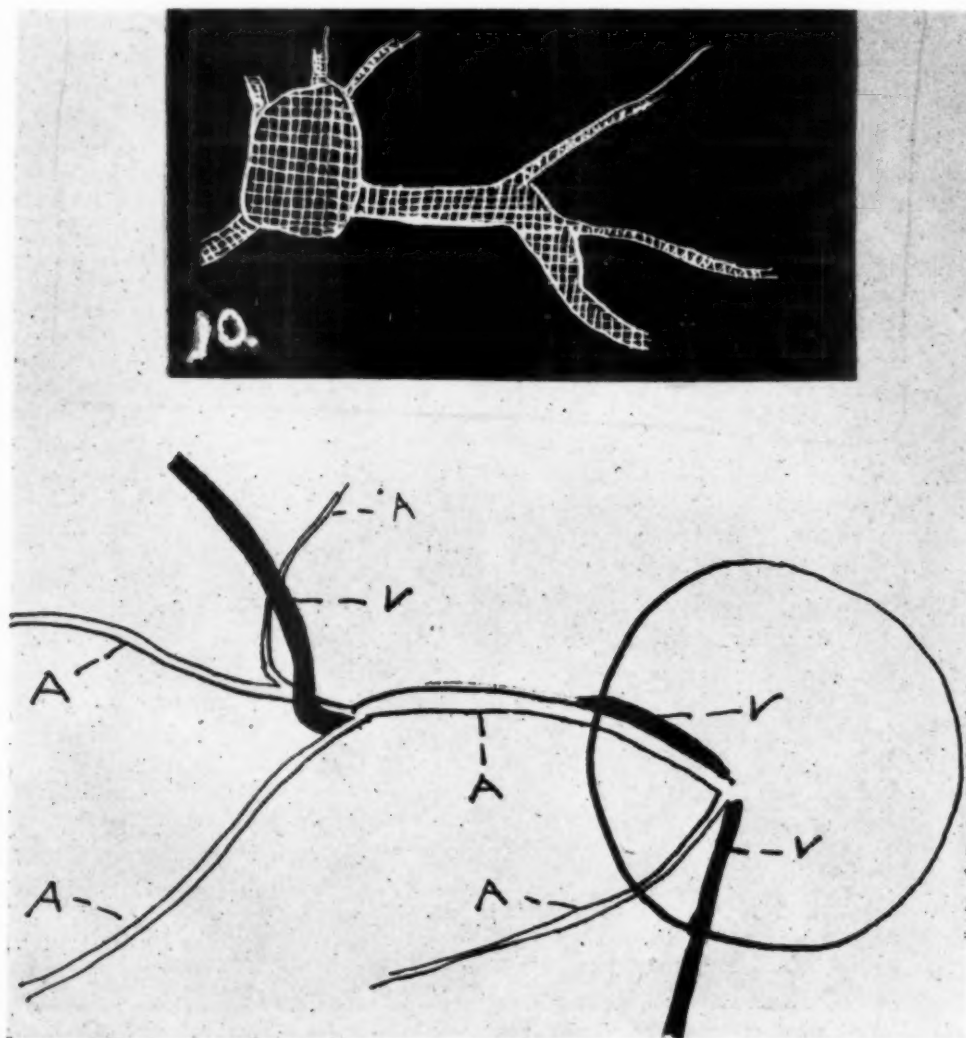
If both eyes are used (binocular fix-

work was the smallest white disc provided with the instrument ($\frac{1}{2}$ degree),* but more satisfactory objects can be made by fusing into beads the end of hair like silver wire (such as

*The manufacturers of the stereocampimeter (B. & L.) supply the objects in two scales, one marked in degrees the other in millimeters. Those marked in degrees are preferable.

the strings of musical instruments are overspun with). These minute spheres are then exposed to the fumes of hydrochloric acid to give them a lusterless, dull white finish; or, if a chalky white finish is desired, they may be dipped in ordinary white writing fluid. They

by dipping in the acid or ink. The great difficulty in producing even reasonably accurate objects of fractional millimeter sizes cannot be realized until the attempt is made. The writer worked on the problem for nearly two years and consulted many sources to



Figs. 10 and 11. A wide vessel scotoma with apparent triple branching is shown in 10. The diagram 11 shows cause in vein lying partly under the artery. See p. 496.

can be easily mounted by thrusting the appended wire thru a pin hole in a strip of the chart paper (see illustrations). It is of advantage to vary the size according to the reactions of the particular case. Some spheres will be too small, others too large; some too dull, others too bright. The white balls get duller with age and are brightened

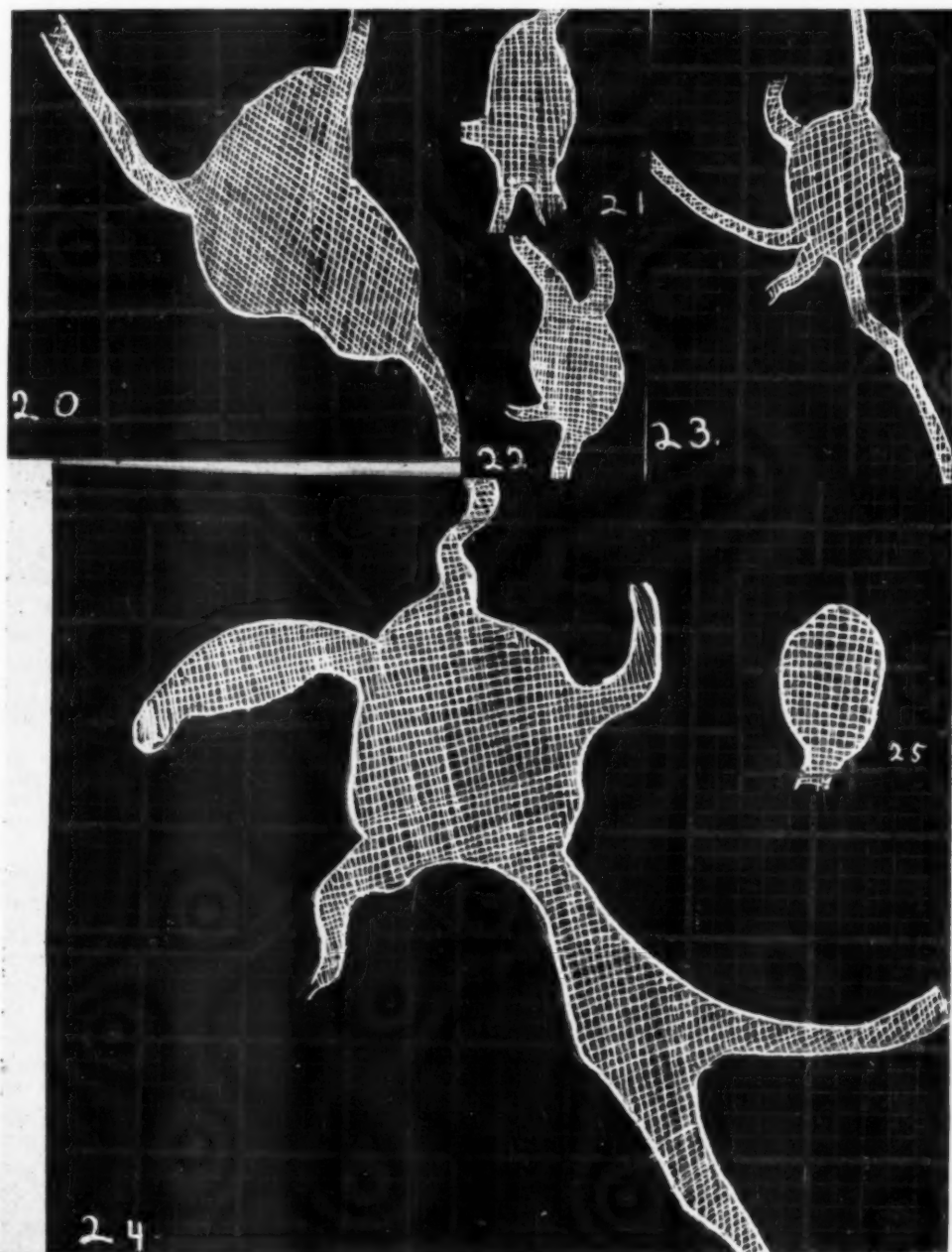
no avail until the above described method was hit upon. With a little practice very accurate spheres can be made, even smaller than $\frac{1}{4}$ mm. and can be measured with a micrometer.

5. The point of fixation is made bright and sharp by a very white chalk mark. This is in accordance with the principle set forth in Helmholtz—

when the object is bright and sharp that portion of the retina is sought out (the fovea) in which such objects are best seen; whereas, if the object be dim, that portion of the retina best suited to dim perception is sought (extrafoveal).

6. **The lamp used is one specially designed to give shadowless illumination, standardizable and uniform in color and quality, supplying an intensity of fifteen foot-candles (mea-

**Mechanical construction by J. H. Penny, 324 Livingston St., Brooklyn, N. Y.



Figs. 20-25. Scotomas in pathologic cases. 20. Venous engorgement. 21. After pressure over internal carotid. 22. Same case, normal. 23. Scotoma after ligation of common carotid. 24. Edematous swelling of nerve and retina. 25. Normal blind spot of other eye. See p. 502.

sured on the slate with the ***General Electric Company's foot-candle meter). It is so attached that the light maintains the same relation to the slate during adjustments of the instruments, and is passed thru a bluish ground glass to give the quality of daylight (as used by Bausch & Lomb Company in their Ives Visual Acuity objects).

7. The method of signalling is usually by tapping.

8. Markings are made with light colored fine pointed wax pencil (of the newer metal magazine type) directly, instead of being copied from the slate on white records. As suggested by the writer, (*Am. Jour. of Ophth.* Sept. 1924—Campimeter Recording and Plotting Chart) this method reduces time and effort about fifty per cent.

9. The subject is allowed to close his eye frequently.

10. The blind spot is outlined as usual by passing from the seeing to the nonseeing area, and a line connecting the dots is drawn.

11. The object is next moved in a wandering fashion around the periphery of the blind spot, a millimeter from it, until it suddenly disappears, when a dot is marked. This place is then approached from the opposite direction and at right angles to the supposed course of the vessel but at about 2 mm. further from the edge of the blind spot and its point of disappearance again noted. Alternate sides are thus plotted, each point being about 1 mm. in advance of the preceding. In this way branching and cross-vessels are not missed, and the twistings and widenings are easily followed.

12. If a crossing vessel is picked up far out it can be traced in a similar way to the nervehead, but it very difficult to locate a vessel far out in the field without having been led to it while mapping.

13. The patient may rest as often as necessary; but each time work is resumed one or two points of the map should be checked until the new plot coincides.

The following data were disclosed by the employment of the above tech-

nic on the forty normal eyes. It is to be noted that this set of experiments does not attempt to study the quantitative aspects of the subject at all.

1. When making pressure on the globe with the finger, tho such pressure be constant and uniform, the scotoma tends to undergo progressive widening as if some adjustment were taking place continuously (as we know intraocular pressure to do). For this reason it is not possible to follow a single vessel thru any protracted period of time—only the main vessel trunks having thus far been studied. If pressure be made on the globe—while the fellow eye is closed—it will be noted that after a minute or two the visual field begins to contract and this keeps on tho the pressure is constant, but immediately returns to normal when the pressure is released. Such a marked change, we can see ophthalmoscopically, is accompanied by an emptying of the vessels of the retina and would therefore suggest a parallel phenomena to that of experiment No. 1.

2. In holding the breath similar changes are produced, and again only the main vessel stumps can be studied a short way out,—for obvious reasons.

3. When the head is held lower than the trunk the same change occurs and extends the full length of the plotting.

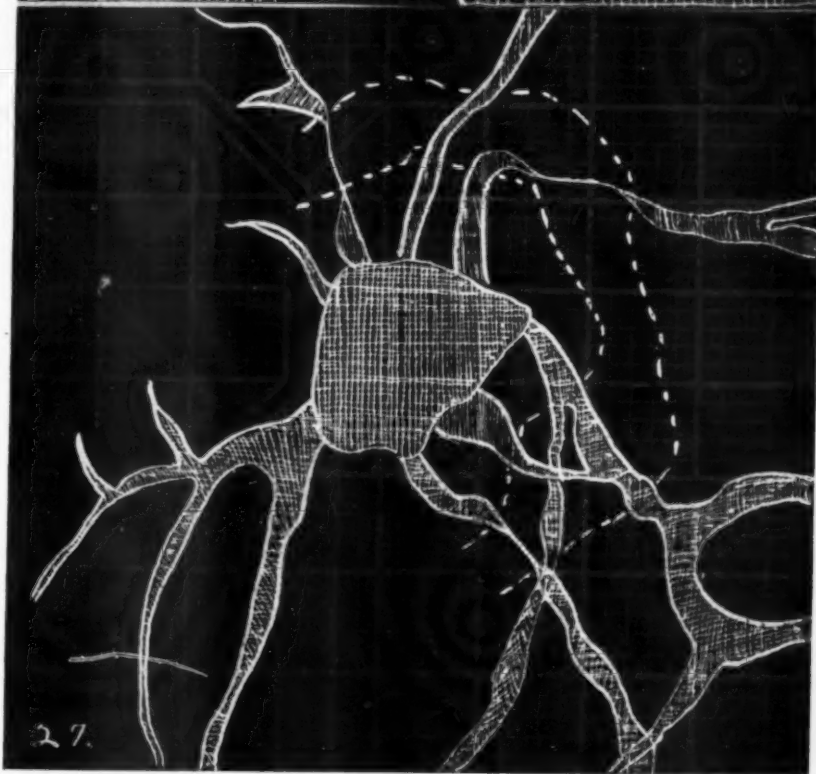
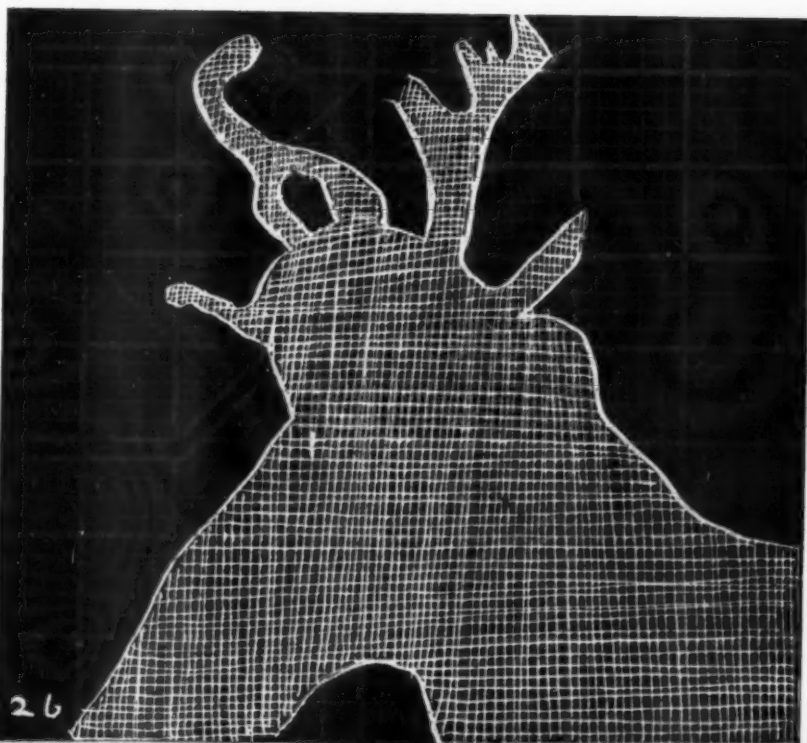
4. Pressure on the opposite eye produces the same widening, arteries and veins being affected, but the latter most.

Experiments Nos. 1, 2, 3 and 4 produce the widening almost instantaneously and return to normal quite as quickly, before any ophthalmoscopic appearance is evident. (It is noted that it is not necessary to have the subject of more than average intelligence, and the technic need not be protracted unreasonably).

5. Pressure over the region of the carotid artery produces no effect definite enough to accept as positive evidence.

6. Looking thru a red lens seems to enable mapping of finer vessels—other colors are of questionable help (blue, green and yellow were used).

***Edison Lamp Works of General Electric Co., Harrison, N. J.



Figs. 26-27. Scotoma of edema of retina reduced to 27, normal, by catharsis. See p. 503.

7. Flooding the slate with colored lights does not seem to make the scotoma more definite (red, blue and green were used).

IMPRESSIONS GATHERED.

The impressions gathered from this study are obvious:

1. The vessel scotoma corresponds in each case to arterial or venous structures, as seen with the ophthalmoscope.

2. The width of the scotoma, either localized or general, did not necessarily correspond to the apparent width—localized or general—of the vessel mapped*.

3. The arteries and veins map with about equal facility tho there may be slightly more ease in the case of the veins.

4. The root of the scotoma, as it emerges from the blind spot, seems slightly less absolute in its defects, than when the mapping has progressed more peripherally; whether the mapping has been carried from the nerve-head out or from the peripheral regions in. The appearances and disappearances near the periphery of the slate are thus more positive than near the nerve.

5. The average vessel cannot be mapped nearer to the macula than seven and one-half degrees—tapering off in some instances as they approach it and in others ending abruptly.

6. As periphery is reached the appearance and disappearance of the object is so abrupt and short as to give the effect of flickering on account of the many subdivisions of the vessel branches. Three types of branching seem to occur, as included in the scope of the Stereo-Campimeter. 1. Very few branchings of the larger vessels. 2. Many larger branchings of the larger vessels. 3. Many and fine branchings of the larger vessels.

7. Should the patient's head be inaccurately placed after the plottings have started, the replotting at first does not coincide with the original, but gradually reestablishes itself. (This shows that the mechanism of the eye

can act about the visual line with cart wheel-wise effect.) This is especially interesting in view of the work on "Torsion," particularly that of Verhoeff** (in the American Journal of Physiological Optics, January 1926), and at once suggests a means of measuring such a defect.

8. The width of the plotted vessels may be varied by

a. Very slight or marked digital pressure on the globe.

b. Holding the breath.

c. Holding the head lower than the rest of the body.

d. Pressure produces the same effect on the fellow eye.

9. Arterial and venous scotomas are both affected but the venous more markedly so.

In reviewing these studies too much emphasis cannot be laid on certain points as regards the technic.

First—It must be remembered that the individual and personal attitude toward this type of technical work varies considerably. We have always been taught that this defect, if it existed, was very faint, that such a thing as an absolute scotoma was incompatible with retinal efficiency and that fixation and other points in technic precluded the plotting of such small and faint defects.

Second—Previous workers, as Bjerum, Gradle, Marlow, Igersheimer, etc., attempted their studies, for the most part, at a distance incompatible with even reasonably good fixation for such small areas as the vessel scotoma. Their discouraging statements have, perhaps, prevented other attempts.

Third—Very small objects are essential. The duration of the test does not seem to tire the fixation mechanism, but there may be a retinal and mental fatigue which must be taken into account.

Fourth—Steady fixation is essential.

Fifth—Uniform illumination is essential.

Sixth—The vessel scotoma showed must be approached at right angles to its course (a fundamental principle in all branches of perimetry).

*Vascular anomalies of form and arrangement must constantly be watched for, lest the interpretation of the result be influenced.

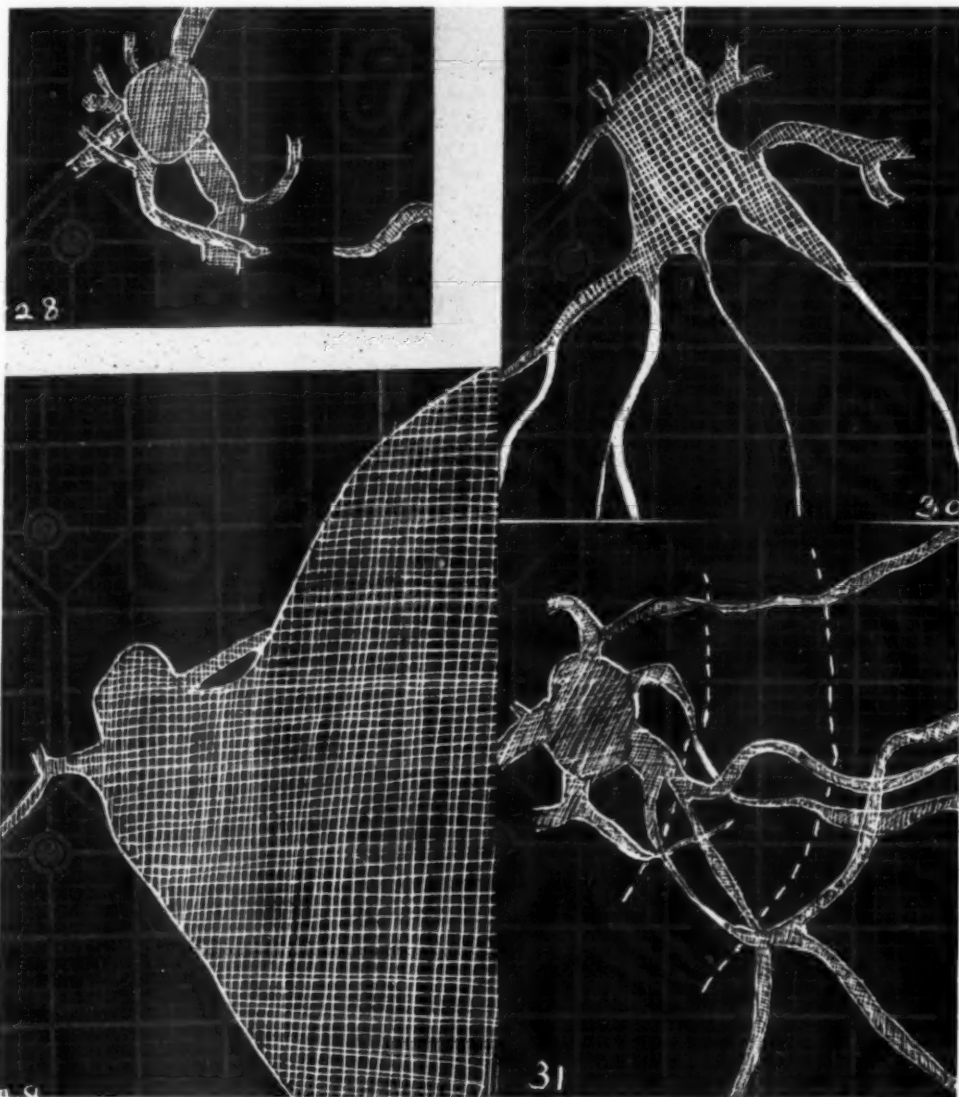
**Quoting a paper written in 1899.

CONCERNING THE INTERPRETATION OF FINDINGS

THEORETIC CONSIDERATIONS of the physiologic findings can, perhaps, be understood by a consideration of the known facts at our disposal.

about .2 mm. to .3 mm. In discussing the entopic phenomena, J. Müller is quoted by Helmholtz¹⁴ to prove that the vessel shadow can be cast in the rod and cone layer.

The second consideration should be



Figs. 28-31. Progress of same case as 24-27. See p. 503.

The first consideration should be that the relations are such as to make the scotoma perceptible. Thus we know that the retinal vessels are in a position which enables them to cast a shadow on the percipient layer of the retina. The distance of these vessels from the layer which perceives their shadows is

that the scotoma would be expected to be absolute. First, the modern writers have fallen into the habit of considering the scotoma as only relative, Helmholtz speaks of it as a blind area.¹⁵ Second, if we study our retinal vessels entopically we see them as very black lines. Since these black lines are the

shadows of our vessels against the brightly lit background we know that it is possible to get such a contrast from them. (In applying the method best suited to this it is easiest to use the electric ophthalmoscope bulb on the eyelid so the light will penetrate the sclera—then by slow oscillations we shift the normal shadows in such a way as to bring out the pattern.) Third, we sometimes see the shadow of a vessel ophthalmoscopically (when using parallactic displacement) in cases of congenital anomaly or marked anatomic variation. Fourth, the blood stream is more opaque than the underlying retina, particularly perhaps as regards the venous blood.

A third consideration must be that the width, or variation in width of the scotoma, is not necessarily identical with the width, or apparent width of the retinal vessels.

First, we must remember that the width of the vessels under consideration is variable thru their relation to systemic vessels and to the intraocular pressure. [See lengthy discussion by Elliot—*Treatise on Glaucoma*.]

Second, that they have a perivascular lymph space which probably varies, perhaps influencing the size of the vessels.

Third, that the overlying and underlying structures may again influence the apparent and actual size of the vessels, thru pressure or traction. (The variations in the choroidal vessels as discussed by Magitot).¹⁶

Fourth, it would seem possible that the difference in the refractive index of the vascular, as compared to the adjacent tissue, may account for the variations in the shadow production.

Fifth, it is more than likely that the pressure phenomenon, intravascular as well as intraocular, may give rise to retinal disturbances in the immediate vicinity of the vessel resulting in variations of sensitivity. Perhaps this accounts for such wide and sudden changes in the width of the scotoma when pressure is made with the finger or with posture, etc.

Sixth, it must be realized that our vessel scotoma is not the vessel itself projected, but is the shadow of the

vessel projected. This is understood when we recall that the vessels occupy the innermost layer of the retina, yet perception is carried on by the outermost. This appreciable distance, (.2 mm.) perhaps gives a slightly widened shadow shielding more elements than the vessel alone would do, and making variations more apparent.

Seventh, since the width of the scotoma is varied so easily and profoundly, it may be that we must consider the influence of intraocular vascular systolic blood pressure, as compared to its diastolic pressure even under normal conditions. (See the elaborate work of Foster Moore).²³

Eighth, the sympathetic nerve fibers which we know to be related to the vascular structures may be factors in varying the vessel tone and so influence the pressure within the vessel and the structures immediately adjacent thereto.

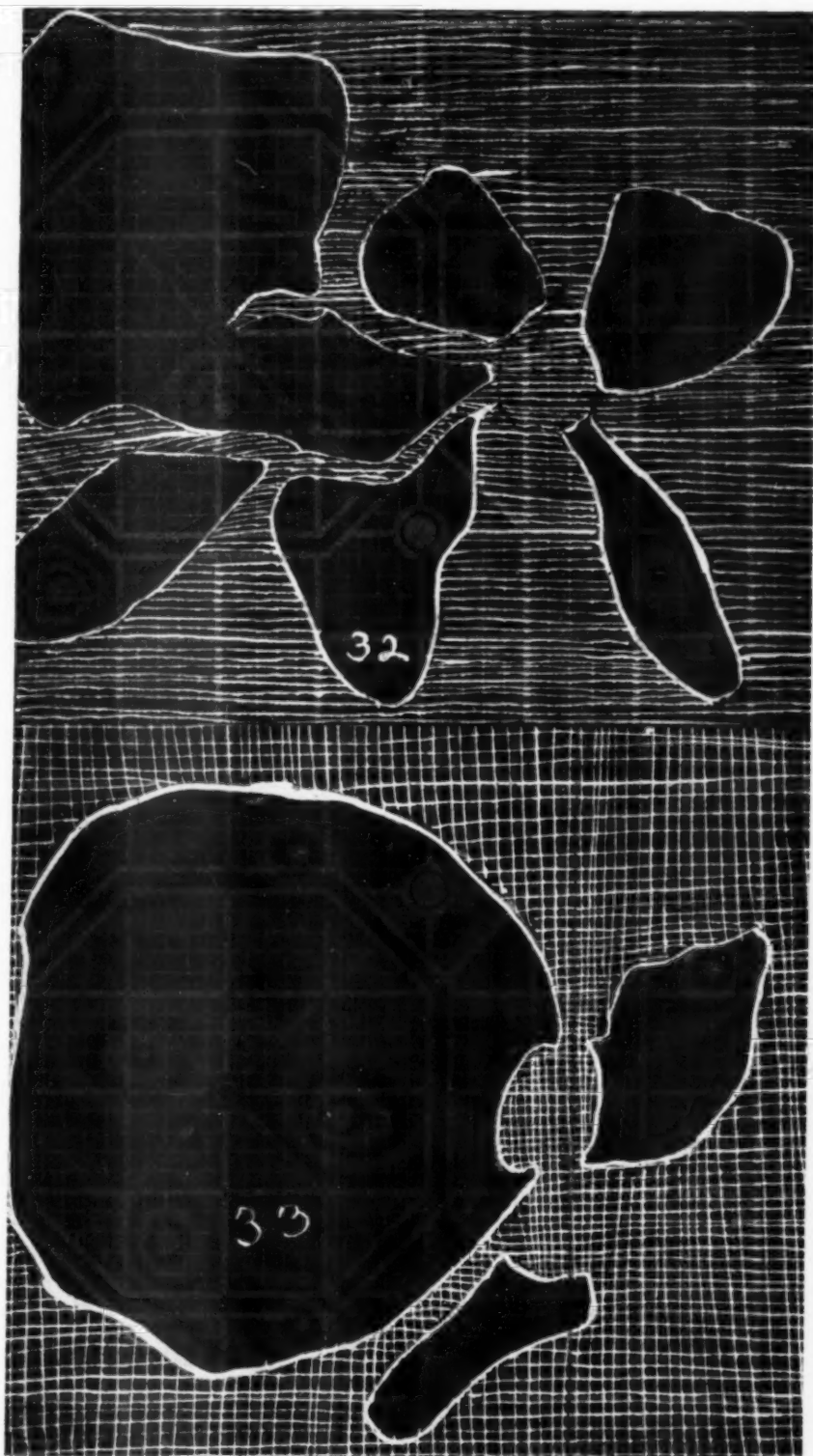
Ninth, perhaps the changes come thru influence from the cerebral or ganglion centers remote from the eye, due to reflex nerve action or variation in gaseous tension in blood, lymph or cerebrospinal fluid.

Tenth, simple variations in ocular tone and all those factors which we know normally influence it seem very direct. Some of these may be enumerated as follows:

1. Stimulation of the cervical sympathetics causes a rise in intraocular pressure. (Adamiuk.¹⁷)
2. Contraction of the unstriated muscle fibers in the orbit shows a rise in intraocular pressure. (Parsons,¹⁸ Starling.¹⁹)
3. Contractions of the extraocular musculature produce hypertension. (Lederer.²⁰)
4. Digital pressure causes a temporary rise in intraocular pressure.²¹
5. Contusion of one eye causes hypertension of both, thru choroidal congestion.²²

(We are not here concerned with factors causing a decrease in intraocular pressure.)

Eleventh, we have the reaction time of two individuals to consider in making these plottings,—the subjects and the examiners.



Figs. 32-33. 32. Contracted field and fanned out vessel scotoma in tuberculous perivasculitis. See p. 503.
33. Contracted field and fanned out vessel. Scotoma in pigmentary degeneration of retina. See p. 504.

Twelfth, it would also seem possible that the nystagmoid movements of the normal eye might contribute to some variations.*

PATHOLOGIC CONSIDERATIONS OF THE VESSEL SCOTOMA.

Having set forth such material as we have at hand on the normal vessel scotoma, we may consider the pathologic. When studying these changes, as well as the normal, it is very interesting to keep in mind the controversy as to the etiology of glaucoma, as typified on the one hand by the vascular school (Magitot and Bailliant) and the other by the filtration school (Elliot.) It would seem possible that the present studies should supply more fuel to light their fires.

The technic may need to be varied slightly in the pathologic studies as compared to the normal. The reduced vision which some of these patients necessarily show, must be allowed for, in selecting the objects—variations in the size and whiteness. When working out the vascular relations of a central scotoma,** a ruby glass is invaluable, as it is also in certain cases not showing a central scotoma.

It would seem that the most logical type of case to study first would be that in which definite angiopathic etiology exists. First, in such a group, would perhaps be simple congestive phenomena, then those of congestive type with permanent changes and finally those of a purely organic character. Later we can study diseases of adjacent structures as related to the vessels. Of course a great mass of material must be collected before we can expect to draw any conclusions for general diagnostic purposes, and it is

*These nystagmus like movements are best seen when examining the eye with the highest powers of the slit-lamp microscope.

**The term ruby glass has been used in this paper in a rather broad sense. Actually the glass used was a red matched to that of the purest spectral red. The same applies to the other colors used. By using the words "ruby glass" it is not meant to imply that it must be spectroscopically perfect. A red free filter was also employed, using that provided with a Zeiss Slit Lamp. No peculiar advantages were disclosed by it, however.

not proposed to discuss the theoretic conceptions of the pathologic cases at this time. Encouragement, however, seems to be offered thru consideration of the appended material.

CHARTS OF CASES

Chart 20 is the case of J. S. who presented herself on December 9th, 1925 with pulsating exophthalmus of the left eye showing a greatly enlarged blind spot with a relatively normal vessel scotoma. Ophthalmoscopically there was marked venous engorgement only. A 1½ mm. white sphere was used as an object.

Chart 21 is also the case of J. S., taken at the same time, but now shows a normal blind spot and vessel scotoma three minutes after making pressure in the neck under the angle of the jaw (left side) in an effort to compress the internal carotid artery, thereby causing a decrease in the exophthalmus, cessation of pulsation and bruit. A 1½ mm. white sphere was used.

Chart 22, also J. S., mapped the same day, but showing an apparently normal blind spot and vessel scotoma in the unaffected right eye. A 1½ mm. white sphere was again used.

Chart 23 is the case of J. S. on December 22nd, 1925. There had been a ligation (on December 9th) of the common carotid artery on the left side. Ophthalmoscopically, the veins still showed marked engorgement and there was a very faint "peach bloom" edema of the entire retina. It is interesting to note the practically normal blind spot and vessel scotoma. A 1½ mm. white sphere was used. The other eye showed a normal blind spot and vessel scotoma.

Chart 24 represents the case of E. S. on December 16th, 1925, who complained of blurred vision during the past week. Tho all physical, laboratory and X-ray examinations showed negative results, the intestinal contents were very toxic from histamin. Ophthalmoscopically there were 3 diopters of edematous swelling of the nerve, also retinal edema, above and nasally for about 1½ nerveheads. There was slight fullness of the veins. O. D. V. was 6/4. There was an enlarged blind

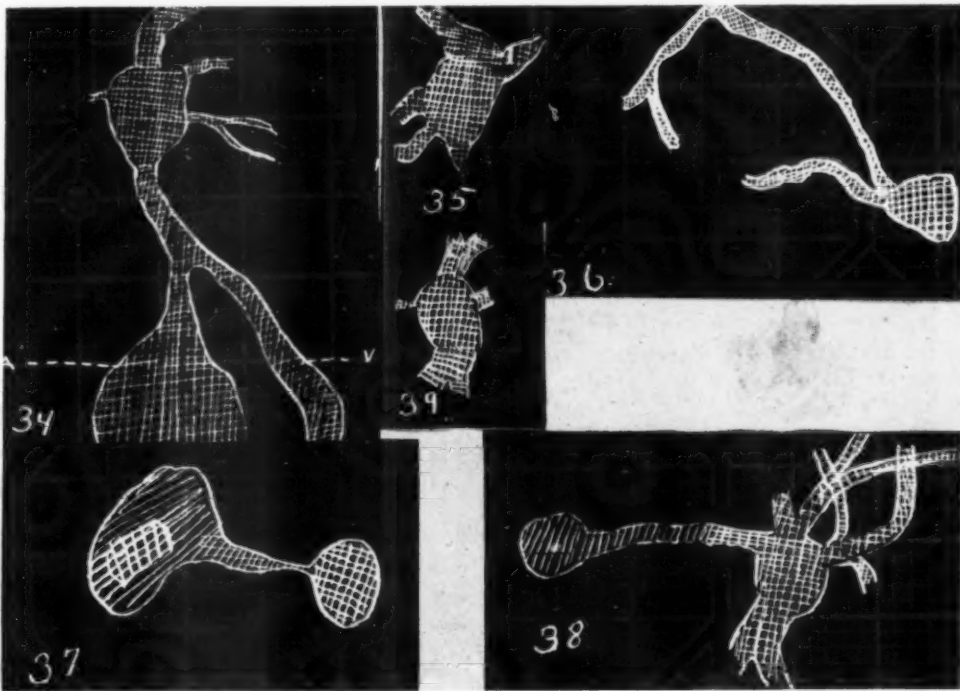
spot and vessel scotoma as tested with a 1 mm. white sphere thru ruby glass.

Chart 25 is also the case of E. S., on December 16th, 1925 but shows the normal blind spot of the unaffected left eye.

Chart 26 is the case of E. S. on December 19th, 1925 when catharsis had been ineffectual. There was an increase in the edema and a few striate hemorrhages appeared. The same size

the extrapapillary region. A 1 mm. white sphere was used thru ruby glass.

Chart 29 shows the case of E. S. on January 8th, 1926 when she had been back at work one week and catharsis had been discontinued. The fundus showed an extension of the edema and a few fine hemorrhages superior and temporally on the nerve edge. A 1 mm. white sphere thru ruby glass was used again.



Figs. 34-39. Scotomas: 34 cases of choroditis, vitreous opacities and optic atrophy. 35. suspected chronic glaucoma. 36. alcoholic amblyopia; 37. case of retrobulbar neuritis; 38. same case later; 39. same case still later. See p. 504.

test object and ruby glass were used.

Chart 27 shows the case of E. S. on December 24th, 1925. The charts now showed the effect of three full doses of castor oil, two of C. C. pills and an enema. The area indicated by the dotted lines corresponds to the zone of greatest extrapapillary edema, as seen ophthalmoscopically. A 1 mm. white sphere was used, again thru ruby glass.

Chart 28 is the case of E. S. on January 2nd, 1926, who had colonic irrigations every other day, the third irrigation being the night previous to the examination. Note that the blind spot was normal tho there was a slight edema of the nerve and a small area in

Chart 30 is the case of E. S. on January 9th, 1926 showing the effects of two full doses of castor oil and a high colonic irrigation of five gallons of water. A 1 mm. white sphere was used thru ruby glass.

Chart 31 is the case of E. S. January 22nd, 1926 showing the satisfactory results of daily doses of cascara with mineral oil. The dotted line corresponds to the most marked area of extrapapillary edema. A 1 mm. white sphere was used thru ruby glass.

Chart 32 is the case of R. S. on January 14th, 1926; and shows the contracted fields and fanned out vessel scotoma, in a case of tubercular peri-

vasculitis ("periphlebitis?") in which vision was maintained at 6/15. A 3 mm. white disc was used.

Chart 33 is the case of J. B. on December 6th, 1925. The chart shows the contracted fields and fanned out vessel scotoma in a case of pigmentary degeneration of the retina in a Jewish boy, aged 13, who still maintains normal central vision in each eye. A one degree white disc was used.

Chart 34 is the case of L. M. on January 14th, 1926; and shows the fanned out vessel scotoma in a case of choroiditis where the lesion was confined to the area supplied by the vessels corresponding to the fan shaped scotoma. Vitreous opacities were present and there was an early optic atrophy, probably luetic. A one degree white disc was used.

Chart 35 is the case of B. O. on January 8th, 1926; and shows the bulbous roots of the vessel scotoma as it leaves the blind spot in a case of suspected chronic glaucoma. A 1 mm. white sphere was used.

Chart 36 is the case of Sal. on December 7th, 1925. There was a partly recovered alcoholic amblyopia (vision 5/12). The fundus showed a dusty, yellowish tinge and a very noticeable prominence of all the finer vessels, particularly in the region of the macula. The arteries showed a wide central light streak and the veins were full. A 1.5 mm. white sphere was used thru ruby glass. The mapping was done from the region of the macula inward to the nervehead and showed the vessel scotoma approaching to within two degrees of the fixation point.

Chart 37 is the case of C. F. on November 15th, 1925; and showed what would ordinarily be considered retrobulbar neuritis, limited to the papillomacular bundle. The blind spot, however, was connected with the central scotoma by a fine band, which corresponded in part to a small macular vessel. There was no ophthalmoscopic evidence of retinal disease, however. A one mm. white sphere was used thru ruby glass. This case responded to no other treatment than persistent catharsis with colonic irrigations. Very careful clinical and laboratory exami-

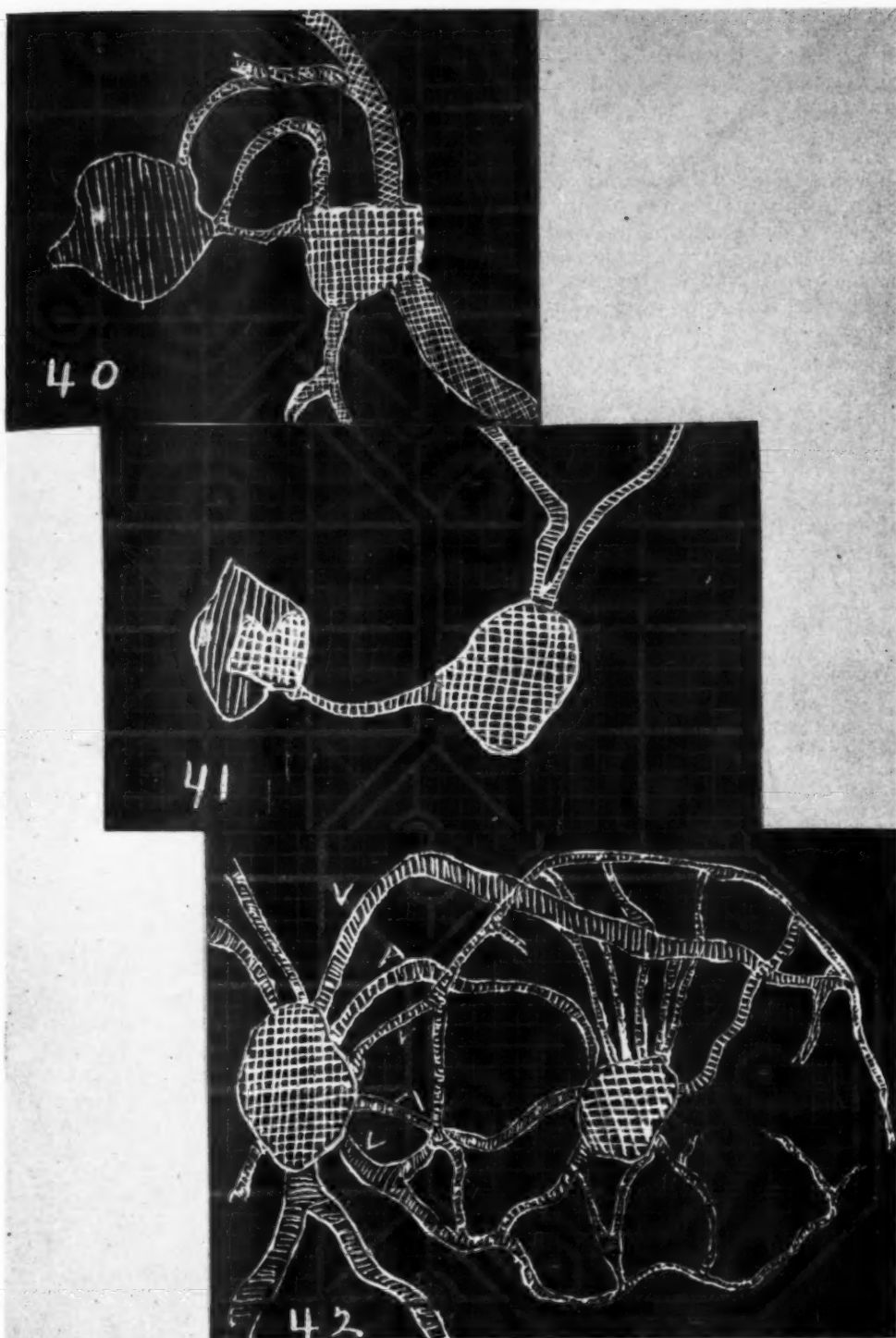
nations gave no positive findings, other than a 4+ toxicity of the stool to histamin.

Chart 38 is again the case of C. F. on December 30th, 1925. It shows that the central scotoma which was absolute at its center has become entirely relative, and the bridge which connected the blind spot with it can be mapped. A one mm. white sphere was used thru ruby glass.

Chart 39 is again the case of C. F. on January 8th, 1926, showing the disappearance of the central scotoma and the connecting bridge. The blind spot appears normal. Visual acuity which was at first reduced to 20/40 minus, finally became normal. A one mm. white sphere was used thru ruby glass. The other eye remained unaffected. At no time was there any discoverable pathologic change in the fundus of either eye.

Chart 40 is the case of Mr. S. on February 9th, 1926. One month after cataract extraction with a plus 8 sphere, combined with a plus 4 cylinder, axis 15°, his visual acuity was 20/25. Ten days later it dropped to 20/40 and clerical work was impossible even with correction. There were no slit lamp or ophthalmoscopic changes to account for the decrease, other than what appeared to be 4 or 5 very fine vessels tufts grouped at the macula with a faint suggestion of radiating vessel stems. The appended chart shows the vessel scotoma of many fine twigs, leading to a relative central scotoma. A 1 mm. white sphere was used, only the central scotoma was mapped, thru ruby glass. About a month later the ophthalmoscope showed fine pigmentary mottling at the macula.

Chart 41, the case of W. W. on December 22nd, 1925 showed a relative central scotoma, connected to the blind spot by what appears to be a vessel scotoma (corresponds ophthalmoscopically to a fine twig). In four weeks the condition cleared up perfectly with colonic irrigations, altho many (not removed) focal infections may have been contributing factors. There was a 4 plus toxicity of the stool to histamin. Vision 6/7 improved to 6/6 plus 2. The ophthalmoscope showed no chorioretinal or other



Figs. 40-42. Macular lesion after cataract extraction. 41. Relative central scotoma cleared up without visible changes in fundus. See p. 504. 42. Case of chronic interstitial nephritis. See p. 506.

changes. A 1 mm. white sphere was used thru ruby glass.

Chart 42 is the case of D. McA. on January 29th, 1926. It shows an interesting plotting of the vessels scotoma representing the region of the macula, in the case of a man, aged 44, the subject of chronic interstitial nephritis with two acute attacks, the first in June, 1925, the second in November, 1925, with each of which he went into uremic coma. Vision in the left eye was 3/15. A 1 mm. white sphere was used. The central scotoma was

mapped with a one degree white disc thru ruby glass. The fundus showed a woolly looking retina, without changes that could be definitely called fresh edema. The region of the macula was occupied by an area of exudates, which did not appear to be new. The vessels showed a marked generalized sclerosis.

In concluding this contribution it is to be noted that neither generalized nor specific conclusions are drawn. To do so would seem unjustifiable in the face of so little material and from such diverse sources.

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INJURIES TO THE CONJUNCTIVA BY SPINES FROM THE COMMON BURDOCK.

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Injuries from vegetable substances lodged in the conjunctiva have not received the attention they deserve. Those from spines of the common burdock must be relatively common altho not described in the literature. These spines are here described with their common effects. Notes are given of four such cases.

The literature regarding injuries arising from foreign bodies lodging in the conjunctiva contains but relatively few references to plant debris as causes of such injuries; and text-books dismiss this phase of the subject with a few words only. The American Encyclopedia of Ophthalmology¹ referring to it says that particles of wheat husks, canary seeds, corn, etc., may enter the eye; also, in another place,² it states: "Very rarely the chestnut or other burr falls into the eye, and leaves some of the spines sticking in the conjunctiva. These are sometimes very difficult to find on account of their light color and semitransparency; and on this account are more dangerous than other foreign bodies, because of their tendency to wander into adjoining tissues." Würdemann, in his book "Injuries of the Eye"³ mentions pieces of rye, wheat, buds of trees, rhizomes, pieces of leaves and hayseeds entering the eye, and discusses the effects of such foreign bodies.

The periodical literature contains only a few isolated reports of injuries of this kind. Dunn⁴ reports a case of collapsed eyeball in a child three years old, due to the unsuspected presence of a grass spikelet in the conjunctival region for over three months. Hunt⁵ reports a beard of June grass, embedded in the conjunctiva for three months, producing the general appearance of gonorrheal ophthalmia with threatened destruction of the cornea. Carboni⁶ also reported a grass spikelet in the conjunctiva; Lantsheer⁷ a sprouting hayseed; Weigandt⁸ three cases of conjunctivitis from particles of plants; Karbe¹⁰ ophthalmia nodosa from particles of the flower known as immortelles getting into the conjunctiva.

Conjunctivitis and complications arising from it are much more frequently caused by plant debris than the

literature would indicate, and this opinion seems logical when we consider that many plants are propagated by pollen and tiny seeds blown about in the air and entering the eye. I have observed a number of cases of ocular inflammation due to spines from the common burdock; and as such cases also probably occur frequently elsewhere in country districts I think it is of interest to report them so that they should be looked for in likely cases. A careful search thru text-books, indexes and other ophthalmologic literature available, has not, so far as I have been able to find, revealed any previous report of burdock spines as a specific cause of conjunctival and corneal injuries.

The burdock (*Arctium Lappa*) is a well known common weed in the United States, found abundantly in waste spaces. The plant grows to three or four feet in height with a thick stem and large leaves. The seed is contained in burrs which grow in clusters along the branches. When ripe these burrs easily become detached and are carried away in the hair or fur of animals and in the clothing of man. More important, however, for the present purpose is the fact that within the burr, in the blossoming end, are innumerable small spines. Inside the ripe, dried burr the spines are so loosely attached that the least jar of the plant dislodges myriads of them, and even a slight breeze can carry them a long way, and they may gain access to the conjunctiva, thus becoming a matter of interest to ophthalmologists.

The spines are very slender rods, pointed at the distal end, and measure from less than one to two millimeters in length. When seen under the microscope they are almost colorless, semitransparent, and barbed with com-

paratively large thorns thruout their entire length. The barbs, numbering from thirty to forty, are long and are attached to the spine at an acute angle to the pointed end. The appearance will be better understood from the photograph under low power magnification, and it will be seen that it is easy for the spine to securely bury itself in loose tissue.

The symptoms usually present, in irritation due to burdock spines and similar causes, are marked lacrimation, photophobia, and perhaps blepharospasm, edema of conjunctiva and swelling of the lids. Upon examination with the loupe various conditions of the cornea are found, depending upon the length of time the spine has been in the eye and its location. If it has

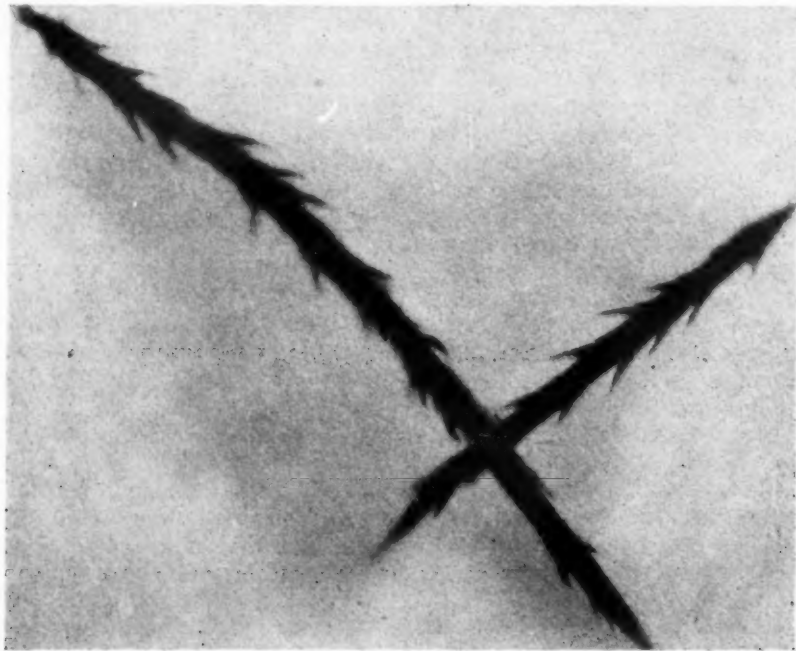


Fig. 1. Photograph of spines of the common burdock, magnified.

If one of these small spines becomes attached to the bulbar conjunctiva it quickly buries itself in the loose tissue causing little or no immediate discomfort. On the other hand, if a spine should become attached to the palpebral conjunctiva where it is in contact with the cornea, it begins to rake the cornea with its barbs and causes such great distress that relief is at once sought from a physician. The victim is always very positive that he has a foreign body in his eye altho perhaps the physician may not be able to find it. In Hunt's case (beard of June grass in the eye) an eye specialist who was consulted insisted that there was no foreign body and sent the patient home. In Dunn's and other similar cases the foreign body remained in place unsuspected for several months.

been in the conjunctiva of the upper lid for a few hours only, there will usually be many vertical scratch marks on the cornea, thru the epithelial layer, due to winking and other eye movements. If the spine has been present for several days a large area of the cornea is likely to be entirely denuded of epithelium with the deeper layers occasionally involved. When the spine is attached to the lower lid the area of cornea affected is usually limited to that part in contact with the spine during movements of the eyeball.

People are more likely to be affected by burdock spines lodging in the eye, during the late fall and early spring months, because then the burrs are dead and dry and the spines are easily borne about in the air. Farmers and others, whose work in these periods

bring them in contact with the plants in clearing away weeds, are especially liable to be attacked. The same applies to children and others tramping or playing about burr infested places. Burdock spine conjunctivitis is therefore more prevalent in spring and fall.

When any of the signs mentioned above are present, the fact should at once lead the examiner to suspect the cause; and questioning the patient will usually bring out a history of contact with burrs. After the writer had extracted one of these spines from a woman's eye she recalled that it had lodged in her eye while sitting in an open car; a gate had swung against a burdock in the fence row and the spine had been borne to her eye by the wind.

A burdock spine in the conjunctiva is very difficult to find because it is very small, colorless and semitransparent. If it is deeply embedded it may be impossible to find. Search should first be directed to a point opposite the most abraded area of cornea. Sometimes the spine sticks straight into the conjunctiva and it can readily be seen with a loupe in a side view of the lid under strong light. When the point only is attached, and the spine is lying flat against the conjunctiva, its detection is more difficult because the spine has the color of the lid. A collection of mucus adhering to the spine will often lead to its detection; or by wiping the lid with a cotton applicator a small hemorrhage will be produced at the point of attachment of the spine and show its location. The most important thing, however, is to suspect its presence in a likely case with corneal markings.

When found a spine can usually be removed with cilia forceps; and, altho the barbs hold it firmly in the mucous membrane, the spine will not break. When too deeply embedded for removal, or when the exact location cannot be determined, the immediate symptoms can often be relieved by rubbing the lid with a firm cotton applicator or glass rod which buries the spine deeper. It should be remembered also that there may be more than one spine in an eye.

A neglected or unrecognized bur-

dock spine in the eye may in time bury itself in the conjunctival tissue and do no further harm; or it may result in corneal ulceration with its sequellae of complications. In Weigandt's case of a plant hair in the conjunctiva a typical chalazion developed. In Karbe's case ophthalmia nodosa developed.

A more or less intense inflammation may be produced, depending upon the individual tolerance and the previous condition of the conjunctiva and its bacterial flora. The condition may vary from simple hyperemia to purulency, corneal abscess and its consequences.

CONCLUSION.

From the foregoing it is not unreasonable to conclude that in the United States the burdock spine as a foreign body in the eye is probably a frequent cause of conjunctivitis and allied conditions; and that as far as the writer can find this cause has not previously been specifically reported.

The condition is more likely to be met with in the late fall and spring. The characteristic sign is corneal scratching, and when such sign is observed burdock spines should be searched for.

Apart from the immediate effect of discomfort to the patient and corneal damages, the embedding of the burdock spine may later set up a lid abscess, corneal ulcer or chalazion, and in such event the original cause may be difficult to prove owing to its small size.

When a case is seen early and the spine removed, recovery is usually rapid, unless there is infection. A few typical case histories are appended.

CASE 1. Geo. U. Age 19 years. Complains of foreign body in the left eye for past 24 hours. Left eye inflamed with all the symptoms of foreign body: blepharospasm, lacrimation, and photophobia. Cornea abraded in upper quadrant near limbus. History of contact with burrs while burning weeds and brush. Removed burdock spine from conjunctiva of upper lid at upper part of tarsal cartilage. Complete recovery.

CASE 2. W. P. Boy age 19 years. Complains of inflamed right eye for

a week. Thought he got something in his eye. Consulted two physicians who found nothing. Says eye scratches when he looks up. Upper and lower lids swollen, edema of conjunctiva of upper part of globe, entire cornea infiltrated and steamy with upper half denuded of epithelium and rough. History of contact with burrs. Removed spine from upper lid. Spine was embedded at upper edge of tarsal cartilage. Recovery complete.

CASE 3. J. C. Age 14 years. Complaints of foreign body in left eye since previous day. Small area of cornea abraded in lower quadrant. History of contact with burrs, while chasing a rabbit at the time the foreign body

entered the eye. Removed a burdock spine from the conjunctiva of the lower lid near lid margin. Recovery.

CASE 4. C. G. Age 35 years. Consulted me in October, complaining of sensation of foreign body in left eye. Scratching sensation near inner canthus with conjunctiva of lid and globe inflamed in this region. Careful search made for a burdock spine but could not find it. The condition cleared up in about two days. On December 5th, opened a small abscess on nasal side of lower lid due, perhaps, to the embedded spine. He gave a history of contact with burrs while hunting in October.

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TRAUMATIC RETINAL DETACHMENT HYPERTENSION, PART OF VISUAL FIELD RETAINED.

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An eye struck with a baseball showed dimness of vision that increased for two months when only light perception remained. A year later tension was increased but was brought below normal by iridectomy. After needling of lens the detached retina was seen but there was still light perception in the temporal field. Read before the Chicago Ophthalmological Society.

R. K., a young male, aged 19, presented himself in the Eye Dispensary May 11, 1925, complaining of a blind right eye and of a persistent, tho intermittent, aching behind the eye. He gave the following account of the trouble:

About a year ago, he was struck in the right eye by a baseball. The eye was very painful, quite red and swollen for nearly a week, gradually improving. A few days after he was able to open the eye, he noticed that the sight was somewhat fogged. The dimness of vision gradually increased till at the end of two months he was able only to perceive light with that

eye. About that time he noticed that the pupil appeared gray.

After the first week the eye was never acutely painful, tho he was always conscious of a vague feeling of discomfort and not infrequent throbs or twinges of pain. In the few weeks preceding his visit to the clinic, he had suffered from three or four rather severe right sided frontal headaches.

Examination: Vision R. = Hand-movements. L. = 1.5 plus 2. No glasses worn for nearly a year. There is a moderate injection of all the bulbar vessels of the right eye, particularly of the episcleral veins. The cornea is quite definitely steamed thruout. The

pupils are equal and round (3 mm.), the left promptly active but the right contracting very feebly on direct illumination. It responds promptly in consensual reaction, and to accommodation. The right lens is gray-opaque and permits no red fundus reflex to be seen. The light projection was faulty on the nasal side and below. Tactile tension R. three plus; L. normal. The Schiötz tenometer shows R. 64.5; L. 25.

The patient was given a 1 percent solution of eserine nitrate and instructed to put a drop in the right eye every four hours. On his return the following day, the right tactile tension was considerably lower. The right pupil was 2 mm. in diameter. The tenometer reading was 51.5, cornea a little brighter. The eserine was continued. On May 16, the right cornea was of almost normal luster and the right tension was 47.5. On the tenth day of continuous use of eserine, the right pupil was 2 mm., left 4 mm.; Schiötz, right 51.5, left 17.

An operation for the relief of the hypertension was advised, which was done on May 26th, 1925, a root iridectomy being done on the right eye. Recovery was uneventful, the patient being allowed to go home on the fourth day. On June 13, the wound was well healed, showing only a normal amount of vascular injection. The eye had been quite comfortable, and the tactile tension was normal or perhaps a bit low. Tonometer, right 11.5, left 17.7. A cataract operation was advised, even in the presence of a faulty light projection, in the hope that the patient might obtain some useful vision in the right temporal field.

On August 1, 1925, a corneal section was made and capsulotomy done with the cystotome. A quantity of semi-fluid lens material escaped, and the remainder was "milked" out. The wound healed normally, the eye being kept under atropine. The pupil was found occluded by capsular and cortical debris and some clotted blood following the operation, and a long course of dionin therapy followed, resulting finally in a complete absorption of lens remains some two weeks ago.

Status praesens: Eye quite free from injection and cornea bright and clear. The pupil is kept dilated to about 7 mm. Anterior chamber deep, owing to aphakia. The narrow operative coloboma of the iris from 11:30 to 12:15 o'clock, root to pupil border, is filled with a dense white, vascular tissue, apparently merging with a pupil membrane below. The iris is a tawny color, becoming a dark slate gray at the root, the pattern atrophic. There are a number of fine, new superficial blood vessels over the sphincter region. (Slit lamp). The iris is not tremulous. There is a uveal ectropion in the form of an irregular pigment ring $\frac{1}{4}$ to 1 mm. wide bordering the pupil. Just back of the pupil is stretched a thin, transparent, somewhat glistening membrane, probably posterior lens capsule, over which are scattered innumerable fine brown dots (Slit lamp). Behind this membrane is seen a layer or mass of yellowish-white semitransparent vascular tissue arranged in sail like folds, coming far forward above, not quite so far below. The regularity of arrangement and evenness of caliber of its bloodvessels as well as its general contour make it almost surely a detached retina. The tactile tension is slightly diminished as compared with that of the normal fellow eye.

The interest in this case is derived chiefly from a consideration of how such an eye is still able to perceive light and shadow. It is now over two years since the accident, which caused the trouble occurred; and we may reasonably assume that the retinal detachment took place immediately or within the first few weeks after the injury, due, probably, to the formation of a voluminous subretinal transudate, following the trauma.

How long the hypertension may have existed cannot be definitely known. The fact that it had attained the high value of 64 mm. when the patient was first seen, without having given rise to acute glaucoma pain, is good evidence that it must have been very gradual in its development. The opacification of the lens was observed by the patient at the end of the second month, and in the absence of any in-

jury to the lens capsule we may regard the cataract formation as the result of serious interference with lens nutrition. This would make the early existence of hypertension probable.

Tests made on the patient's visual field before and after the operations gave identical results—that is, light and shadow perceived in temporal field only. So we may conclude that the retinal disturbance is not a consequence of the surgical procedures.

As to the explanation of the persistent retinal function, three possibilities suggest themselves: (1) A portion of the anterior nasal retina may have remained in situ. (2) A portion of the completely detached retina in the same locality retains or has regained function. (3) Light sense may be retained in a portion of the completely detached retina. Dr. Brown has pointed out that this last possibility is hardly tenable, except in case the choroid is detached along with the retina, the two together furnishing the blood supply to conserve function.

The first possibility, that is, that the adherent retina on the nasal side may have remained in situ and never become detached, I think is probable. In that case we might expect a little function to remain in the attached portion. Leber states that a cure, in the sense of a reattachment, occurs in about 8½ percent of cases, but restoration of

even moderately useful vision occurs in but 3 to 6 percent. Panas (*Traite des Maladies des Yeux*, 1894) states that photopsy is frequent even after a long period of detachment. He also makes the observation that when some light sense persists after ablation, some color sense is not infrequently conserved, the power to differentiate blue and green being earliest lost. Graefe, Hirschberg and Steffan have all cited examples of such an outcome. Bucht has observed spontaneous reattachment after albuminuric retinitis, and Graefe after orbital phlegmon. Panas and Leber have each recorded an instance of reattachment after cataract extraction.

Discussion. DR. E. V. L. BROWN said that it was of course possible that fusion of the retina and choroid near the nasal equator took place and both the retina and choroid in front of this area had been detached. Function in the temporal field might conceivably have been preserved in this way.

DR. HALLARD BEARD (Closing) said that Panas mentioned that cases which appeared most favorable for reattachment were those in which spontaneous rupture of the retina and occasionally of the choroid had occurred, permitting probably an escape of subretinal fluid thru the rupture, allowing the retina to settle back in place.

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METASTATIC CARCINOMA OF THE CHOROID WITH REPORT OF TWO CASES, FOUR EYES.

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More cases of this condition are seen than the reports in the literature would indicate. The salient features deduced from these reports are mentioned. Two cases are reported. Carcinoma of the breast had been excised in each; in one nine years and in the other two and one-half years before. In one case one eye was excised and the pathologic examination was reported. Read before the Ophthalmic Section, Medical and Chirurgical Society of Maryland, 1925.

Metastatic carcinoma of the choroid is of sufficient rarity to warrant reporting, and discussing some of its phases. Usher in 1923, in the *British Journal of Ophthalmology*, has collected and tabulated all the published cases, ex-

primary growth. One of these cases was not autopsied and the other was found to have had a carcinoma of the rectum at postmortem. It has been found most common between the ages of forty to fifty years, the youngest was

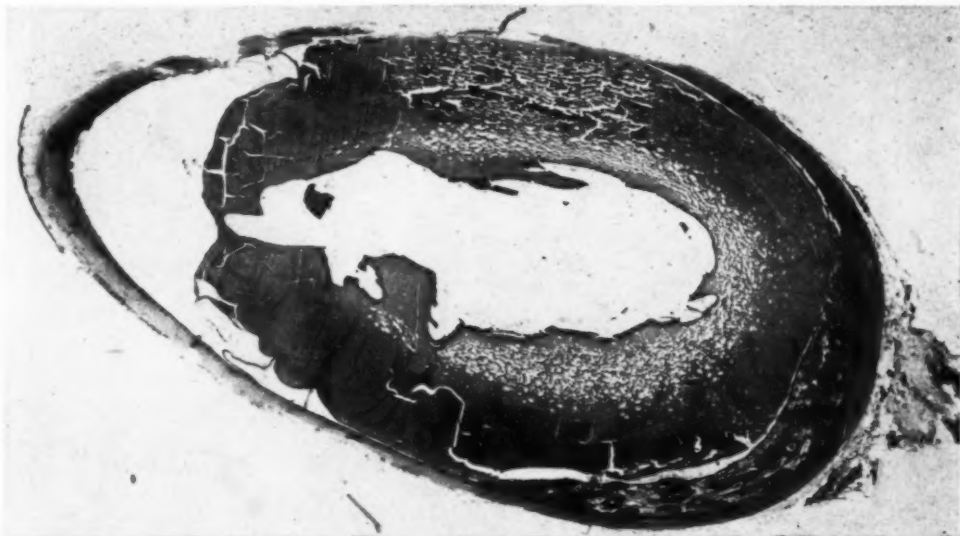


Fig. 1. Cross section of eye showing carcinoma of choroid and detachment of retina.

cept Greenwood's four cases and Maggioro's two cases, which are mentioned but not tabulated.

I have been unable to find any cases reported since 1923. The two cases herein reported make a total of one hundred and eighteen (118) in the literature, thirty being from America. A great many more are undoubtedly seen, but in the terminal stages and often without consultation with an ophthalmologist or others especially interested. In this way they escape being recorded. The following salient features may be mentioned:

In two cases the eyes were enucleated without knowledge of the

twenty, and the oldest seventy-two. As to sex, it is almost three times as frequent in the female as in the male. Tension was normal in fifty per cent of the cases, increased in forty per cent, and subnormal in ten per cent.

The average duration of life, after discovery of the growth in the eye, has been eight months, altho death has occurred in one month and as late as two years. It occurs by far the most frequently after breast involvements; and next, secondary to carcinoma of the lung, but it has followed primary carcinoma of the stomach, thyroid, liver, rectum, esophagus, suprarenals, prostate, and ovary. It therefore may

be medullary, scirrhous, or adenomatous. It also occurs most frequently on the left side; due, it is thought, to the more direct blood stream on this side, and results from thrombi of tumor cells. One-third of the cases occur bilaterally. The growth usually

one can make a differential diagnosis. Hirschberg mentions the presence of small round yellowish deposits about the macula, while Schoeller and Uhthoff mention grayish white points around this region and Usher speaks of the yellow swelling. Broad, flat,

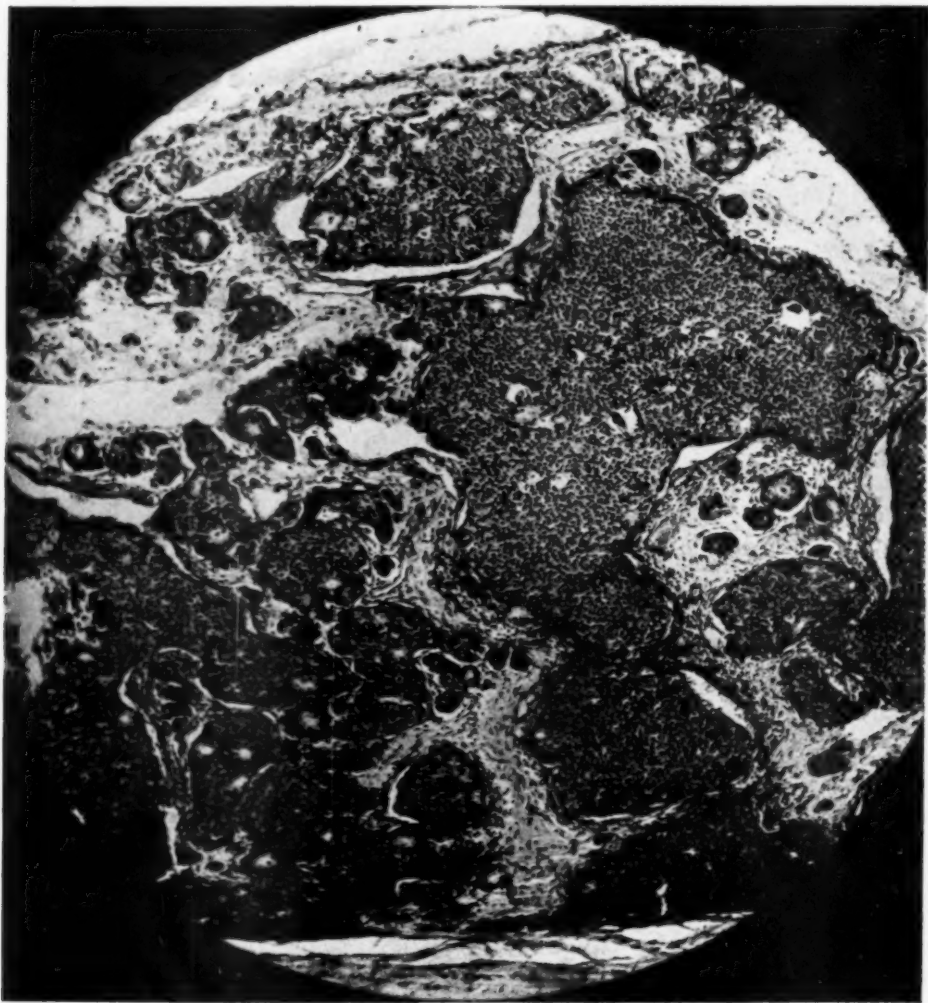


Fig. 2. Section of carcinoma of choroid under low power, showing more or less glandular formation.

starts posteriorly and most frequently on the temporal side, but has extended forward and involved the iris in seven cases.

The question as to whether these cases can be diagnosed from the ophthalmoscopic picture has been frequently raised, and various opinions are held. Swanzy and Werner hold that there are no distinguishing features; on the other hand, Fehr thinks

greenish, yellow deposits in the macular region are described by de Schweinitz. A few cases show multiple isolated growths. Therefore diagnostic features vary widely.

It was not our good fortune to differentiate either case by the ophthalmoscope, the first case being diagnosed by the large fixed bilateral detached retinas and the history of breast removal with secondary involvement after nine

years; and the second case by finding recurrence in lung, spinal cord, and brain, after the discovery of the large flat detachment of the retina which showed darkness on transillumination. In neither case were there any distinguishing features which enabled

time showed consolidation of the lung, which was diagnosed as a recurrence of the carcinoma. Shortly after this, the sight in the left eye began to fail. This was followed in a few months by failure of vision in the right eye. The eye examination in July, 1922, showed

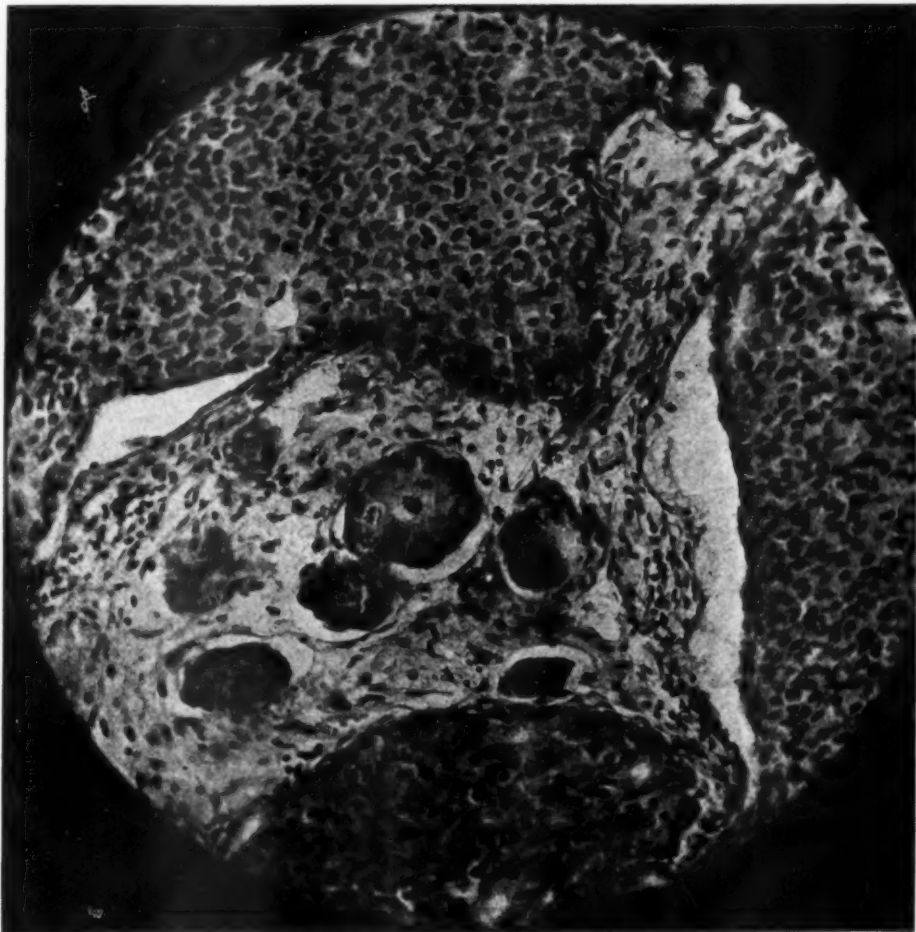


Fig. 3. Section of carcinoma of choroid under high power, showing epithelial character of cells.

us to decide absolutely, altho our tentative diagnosis was carcinoma on account of the previous history, but not from physical findings.

CASE 1. June 28th, 1922. Mrs. S. S. Aged 46. Gave the history that the left breast had been removed nine years previously, which was later found to be carcinomatous (the variety could not be determined). She was considered to be a cured case. But one year ago she developed a cough with loss of weight, and examination at this

some dilatation of the pupils with only slight reaction to light. The pupils were dilated with a mydriatic and each eye showed a large fixed detachment of the retina, more or less yellowish in color. The tension of each eye was normal. In view of the history of the original carcinoma of the breast with recurrence in the lungs, a diagnosis of metastatic carcinoma of the choroid was made. The patient gradually became weaker and died in September, 1922. A request for an autopsy was

denied, but I believe we are safe in assuming the diagnosis was correct.

CASE 2. Mrs. H. A. Aged 36. April 6, 1925, patient came to the office at the request of Dr. Buck, with the history that as a girl she had worn glasses but had had no trouble since then, until ten days before, when she noticed a blur over left eye. For two days she has had some headache, but no pain in the eye.

Past History: Patient had a knot in the right breast which was removed in September, 1922, and this was followed by X-ray treatment. A telephone conversation with her surgeon, Dr. Locher, elicited the information that the growth was a medullary carcinoma with marked mitotic figures.

External examination: Pupils normal in size and both react to light and accommodation. Extraocular movement normal. Tension normal. Slight area of congestion over left external rectus. V.—O.D. 20/15; O. S. 20/20.

Ophthalmoscopic examination: Cornea, aqueous, lens, and vitreous in each eye are clear. But the retina is detached down and in, in the left eye, extending from the margin of the nervehead, well out to the periphery and showing a large separate lobule below. Transillumination showed marked dullness far back on the nasal side just below the internal rectus muscle; patient also appreciates dullness when light is passed over the area. In the presence of the history and physical findings, the diagnosis of metastatic carcinoma of the choroid was made.

April 29th, 1925. Anterior chamber shallow. Tension normal. Vision, light perception. June 4th, 1925. Some circumcorneal injection. Pupils small. Slit lamp shows: Refractive bodies in lens, like drops of fat. Few deposits on anterior capsule. Detachments increasing with presence of new vessels.

June 6th, 1925. Suffering severe pain. Anterior chamber very shallow. New vessels in iris. Tension very high. Enucleation advised.

June 11th, 1925. Enucleation left eye under ether. Patient left hospital on June 13th, and was not seen again until she visited the office on July 1st, when she complained of a curtain before the right eye.

Ophthalmoscopic examination of this eye which had previously been perfectly normal, showed a large, white, fixed detachment, extending from temporal side to below nervehead. Transillumination showed dullness far back on temporal side.

July 24th, 1925. Now has practically complete detachment of the retina of the right eye. Vision is only light perception.

A general survey with X-ray studies in April revealed changes in the spinal column, hilum of each lung, and base of the skull. The patient suffered with pains in the lower limbs, with inability to use the same satisfactorily.

The left eye was fixed in 4 percent formalin solution and sectioned horizontally.

Macroscopic Examination: The eye was sectioned just above the entrance of the nerve. A detachment of the retina was present which extended from the optic nerve to the ciliary region on the nasal side, and from the nervehead to just beyond the equator on the temporal side. The material beneath the detached retina was of a gelatinous consistency. There was a new growth present in the choroid posteriorly, extending from the nervehead towards the temporal side to within 2 mm. of the equator. It was $1\frac{1}{2}$ mm. thick in the center becoming very thin at its margin.

Microscopically: Specimen was stained with hematoxylin and eosin. Cornea was normal in thickness with no changes in substantia propria. Slight encroachment of vessels at limbus. Posterior layers of cornea showed numerous leucocytes on Descemet's membrane with few pigment granules, and there was present some fibrin containing pigment granules. The anterior chamber was shallow and the iris seemed somewhat thinned. The uveal layer was free in several places but this was probably due to fixation and cutting. The lens had been removed. The posterior chamber was filled with a pink staining material. The retina was completely detached and showed secondary changes.

The choroid was filled in many places with large areas of blood which was more marked posteriorly, where it

became several times thicker than normal. As the elevation became greater, there were seen the new formed cells arranged in many places in a glandular formation and occupying nearly the entire thickness of the tumor, and with very little stroma. In other places, there was considerable loose connective tissue. Some of the tumor cells were apparently present in

the posterior ciliary vessels. The cells themselves were quite characteristic epithelial cells with rather large nuclei, and were quite definitely columnar; in many places they were arranged in glandular formation. There were rather numerous mitotic figures corresponding quite closely to the mitotic figures in the section of the original tumor.

ENUCLEATION OF THE EYEBALL UNDER LOCAL ANESTHESIA.

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This paper describes the method of producing local anesthesia for this operation and the brief outline of twelve consecutive cases in which it was used. A summary of the conditions requiring the enucleations is given and the conclusions reached regarding this procedure. It is a report from the Department of Ophthalmology of the Stanford Medical School. Read before the San Francisco County Medical Society, October 27, 1925.

The universal trend of modern surgery is to substitute, whenever possible, local anesthesia for general. As our knowledge of local anesthetics increases and as new technics in their use are developed, more operations come within its scope. It is correct to say that, with the exception of young children, practically every operation the ophthalmic surgeon performs today can be carried out under local anesthesia. In this country, enucleation of the eyeball is usually done under general anesthesia. In presenting this paper to your notice, it is my hope that you will find the method of local anesthesia satisfactory.

This is a report of twelve consecutive cases of enucleation of the eyeball done under local anesthesia at the Stanford University Eye Clinic.

THE ANESTHETIC.

The anesthetic used is a 2 per cent novocain-epinephrin solution. This may be prepared by adding one part of epinephrin (1:1000) to ten parts of a 2 per cent novocain solution. A more satisfactory anesthetic is one to which sodium chlorid and potassium sulphat are added. The addition of the sodium chlorid makes the solution practically isotonic and the potassium sulphat being in itself an analgesic, is useful as an adjuvant, as it not only increases, but prolongs and localizes the anesthetic effect of the novocain.

A useful formula is given by MacGillivray (Trans. Oph. Soc. of U. K., v.43, p. 359).

℞ Novocaingr. x
Sodii chlorid.....gr. ij
Potass. sulphgr. iss
Aq. destill.....oz. j

To this is added 8 minims of epinephrin.

The 2 per cent novocain solution with suprarenin put up by Metz laboratories has proven to be very useful. The anesthetic is put up in 6 c.c. ampules ready for use. Each ampule contains: novocain 0.12 gm., suprarenin 0.0003 gm., sodium chlorid 0.027 gm., potassium sulphat 0.024 gm., distilled water to 6 c.c.

From 8 to 9 c.c. of the solution are used. A 5 c.c. Luer syringe is used with a straight sharp 22 gauge needle, 2½ inches long. The needle should be very sharp and smooth so that it will glide into the tissue with the least pressure. A preoperative narcosis of morphin gr. ¼ and scopolamin gr. 1/150 is given, half an hour before the operation. A laxative is not given the previous evening nor is an enema on the morning of the operation, as they are disquieting to the patient.

The patient enters the hospital in the morning, having had his usual breakfast, is operated in the afternoon and permitted to enjoy a light dinner. The patient may drink as much water as he desires.

TECHNIC.

The conjunctival culdesac is first rendered anesthetic with a 4 per cent cocain solution, by instilling one drop every four minutes, four times. A few drops of epinephrin are instilled before injecting the eye. The ciliary ganglion is then injected. This lies posteriorly in the orbit in an angle formed by the optic nerve and the external rectus muscle. An injection made in the vicinity of the ganglion influences the sensibility of all the nerves of the globe. The needle is introduced close to the external orbital margin, at the outer canthus, and pushed inward about $1\frac{3}{4}$ inches, slanting the needle slightly away from the external orbital wall and towards the ganglion. During the insertion of the needle, one c.c. of the solution is injected and 3 c.c. are injected at the ganglion. This anesthetizes the ciliary ganglion and the external rectus muscle. The inferior rectus is next injected. The needle is introduced at the middle of the inferior fornix for a similar distance, holding the needle slightly away from the floor of the orbit. About $1\frac{1}{2}$ c.c. of the solution are injected during the insertion. The internal and superior recti muscles are anesthetized in the same manner as the inferior rectus, by inserting the needle at the inner canthus and the middle of the superior fornix. Care must be taken to hold the needle a little away from the wall of the orbit and so escape the bone. Ten minutes are allowed to elapse before beginning the operation.

CASES.

CASE 1. *Phthisis Bulbi*. J. L., a man, aged 60 years, was first seen at the clinic Sept. 20, 1924, complaining that his left eye was painful at times. He had had a lid operation on that eye in 1923, also a cataract operation at the San Francisco Hospital in July, 1924. There was no vision in the eye. Examination revealed a soft and shrunken eyeball and trachoma scars on the eyelids. Enucleation was done Oct. 1, 1924. No preoperative narcosis was given. He complained of a slight pain when the muscles were being secured with a strabismus hook. There was

very little bleeding following the enucleation.

CASE 2. *Escape of Vitreous Following Cataract Extraction*. C. D., a man, aged 69 years, was seen on Dec. 1, 1924. The diagnosis of the right eye was absolute glaucoma and incipient cataract. There was a mature cataract of the left eye with a poor nasal field. The vision was hand movement. The tension of the eye was 30 mm. Hg (McLean). This probably was a glaucomatous eye. Combined extraction of the left cataract was done Dec. 3, 1924. During the night the patient was restless, got out of bed, vomited a number of times and coughed. The next morning the dressing was blood stained; the corneal flap everted; escaped vitreous on the eye pad; the eyeball collapsed. Enucleation was done five days later. He received a preoperative twilight narcosis consisting of: morphin gr. $\frac{1}{4}$ and scopolamin gr. $\frac{1}{150}$. The scopolamin was repeated twice at intervals of forty-five minutes. Half an hour after the last injection of scopolamin the eye was anesthetized and enucleated. As the eyeball was collapsed there was some difficulty in securing the optic nerve. When the eye was removed it was found that the sclera was perforated and a stump of the eyeball left attached to the optic nerve. There was very little hemorrhage, the stump was easily located and severed from the optic nerve. The anesthesia was perfect. Later in the day the patient wanted to know when his eye was to be taken out.

CASE 3. *Staphyloma Corneae*. D. H., a man, aged 72 years, had had his right eye injured in Sept., 1924, and when first seen on Jan. 26, 1925, there was present a large staphyloma of the cornea with the iris adherent in a mass, which probably was the lens. The patient was given a preoperative narcosis, of morphin gr. $\frac{1}{4}$. There was considerable hemorrhage following the section of the optic nerve.

CASE 4. *Glaucoma with Chronic Iridocyclitis, Trachoma of Both Eyes*. Mrs. H. H., aged 73 years, was first seen March 5, 1925, complaining of sore eyes for many years. The left eye became blind years before, following pain. The vision of the right eye was

fingers at 6 inches. Examination showed glaucoma and evidence of old trachoma in both eyes. The left eye was painful and red at times. The patient continued to complain of pain in the left eye. A month later, the left eye was found to be soft and the tension was 17 mm. Hg. (McLean). The eye was enucleated June 19, 1925. A preoperative narcosis, of morphin gr. 1/6 and scopolamin gr. 1/150, was given. There was no pain and practically no bleeding.

CASE 5. *Absolute Glaucoma*. F. R., a man, aged 70 years, developed absolute glaucoma of the left eye following an injury a month previously. The eye was painful with a tension of 115 mm. Hg (McLean). An attempt was made to do an iridectomy, following a posterior sclerotomy. The corneal incision was made with a Graefe knife. Just previous to the making of the conjunctival flap and completing the incision, there was an escape of vitreous, followed by a hemorrhage in the anterior chamber. The corneal incision was stitched up, the eye anesthetized and enucleated. There was practically no bleeding. The patient did not receive any preoperative narcosis.

CASE 6. *Septic Endophthalmitis*. J. P. a man, aged 42 years, seen June 30, 1925, complaining that the right eye had been struck with a piece of steel. Examination of the eye revealed: vision, perception of light; a conjunctival cut in the lower nasal part; marked palpebral and bulbar conjunctival injection; ciliary injection; hazy cornea; a very green iris with its markings absolutely indistinguishable. The pupil was irregular and pin point. The eye was tender and the upper eyelid edematous. The roentgenogram showed a foreign body just behind and below the eyeball. The patient was given a milk injection. An attempt to dilate the pupil was unsuccessful.

Examination on the following day showed the anterior chamber full of pus, the cornea white and soft. The eye was enucleated; the patient receiving a preoperative narcosis of morphin gr. 1/4 and scopolamin gr. 1/150. When the eye speculum was placed, the lower part of the cornea ruptured and pus escaped. The ruptured cornea

was stitched up before the enucleation. There was no hemorrhage or pain.

CASE 7. *Absolute Glaucoma*. G. K., a man, aged 56 years, had had an absolute glaucoma of the right eye for some time. The eye had been painful for four days. Enucleation was done July 17, 1925. The patient received a preoperative narcosis, of morphin gr. 1/4 and scopolamin gr. 1/150. There was no pain or hemorrhage. Ocular fat presented thru the conjunctiva. A purse string suture was placed in the conjunctiva.

CASE 8. *Phthisis Bulbi*. P. B., a man, aged 42 years, seen July 20, 1925, had lost the vision of the right eye, when 12 years of age. The cause was unknown. The eye had been painful during the last two weeks. Examination revealed a shunken and hard eyeball. Enucleation was done the following day. The patient received a preoperative narcosis of morphin gr. 1/4 and scopolamin gr. 1/150. There was no hemorrhage. Orbital fat presented in the conjunctival incision and a purse string suture was placed.

CASE 9. *Phthisis Bulbi*. P. H., a man aged 26 years, seen August 26, 1925, had had an accident to the left eye when 3 years old, after which it became blind. He complained of frontal headaches, radiating to the right eye for the last two weeks. Examination showed a shrunken and soft eyeball. The eye was enucleated three days later. A preoperative narcosis, of morphin gr. 1/4 and scopolamin gr. 1/150, was given. There was no hemorrhage. Fat presented and a purse string suture was placed in the conjunctiva. The patient left the hospital the next day.

CASE 10. *Staphyloma of Cornea and Sclera*. J. P., a man, aged 65 years, had had an injury to the left eye 26 years before. He was first seen in the clinic in 1910 and the diagnosis at that time was chronic simple glaucoma. The eye gradually increased in size. Examination on August 10, 1925, showed a marked staphyloma of the cornea and sclera extending to the equator. The sclera was very much attenuated and the bluish choroidal tissue was seen thru it. The whole eye was greatly enlarged. The tension was 2+; the eye blind, and there was a general in-

jection of the globe. The eye was enucleated owing to its increasing in size and injection. A preoperative narcosis, of morphin gr. 1/4 and scopolamin gr. 1/150, was given. There was considerable hemorrhage following the enucleation.

CASE 11. Ectasia of Eyeball with Acute Iridocyclitis. Mrs. K. N., aged 38 years, had had an injury to the left eye when 3 years of age. Following the injury the eye became blind and enlarged. She was first seen at the San Francisco Hospital Sept. 8, 1925, with a history that she had been struck with a baseball on the left eye, 6 days before. Examination showed a marked ectasia of the whole eyeball; no cornea could be distinguished; the eye was markedly injected and very tender. Enucleation was done four days later, the patient receiving a preoperative narcosis, of morphin gr. 1/6 and scopolamin gr. 1/100. When the speculum was placed, the anterior part of the eye, which probably was the cornea, was found necrosed and came off. The eye kept its shape while the muscles were divided and collapsed just previous to the cutting of the optic nerve. There was very little hemorrhage.

CASE 12. Displacement of Lens into Vitreous During Cataract Operation, Acute Iridocyclitis. J. W., a man, aged 68 years, had been operated for an extraction of a hypermature cataract Sept. 11, 1925, and during the operation the cataract was displaced into the vitreous. Four days later the patient developed an acute iridocyclitis. The patient was given milk injections with little benefit. As he had no perception of light in that eye, enucleation was done 8 days later, that is, 12 days after the cataract operation. The eye was markedly injected and very painful—the most painful eye in the whole series. A preoperative narcosis, of morphin gr. 1/4 and scopolamin gr. 1/150, was given. The patient complained of severe pain when the eye was being anesthetized. There was no pain during the enucleation. A moderate amount of hemorrhage followed.

SUMMARY.

Of the 12 patients: 10 were males and 2 were females. The youngest pa-

tient was 26 years of age and the oldest, a female, 73 years. The average age was 56 years; 6 were over 65 years and 3 were over 70 years.

The diagnoses were: Phthisis bulbi, 3. Absolute glaucoma, 3. Staphyloma of the cornea and sclera, 2. Ectasia of the eyeball with acute iridocyclitis, 1. Septic endophthalmitis, 1. Escape of vitreous following cataract operation, 1. Displacement of the lens into the vitreous during a cataract operation, followed by acute iridocyclitis, 1.

Hemorrhage following the enucleations: Practically no hemorrhage, or very little, 9. Moderate hemorrhage, 1. Considerable hemorrhage, 2.

Seven of the eyes enucleated were painful eyes.

With the exception of the last patient reported, who complained of considerable pain when the eye was being anesthetized, the entire procedure gave the patients very little discomfort; and in no case did a patient show apprehension or restlessness sufficient to justify a general anesthetic. As there is no subsequent nausea and discomfort, a patient may go home the same day if it is necessary.

CONCLUSIONS

1. Local anesthetic in enucleation has all the advantages which a local has over a general anesthetic in surgery.

2. The operation becomes a one-man job. The anesthetist can be dispensed with; and, as there is no urgency, the operation can be done without the aid of an assistant. A most useful method when one has to do an enucleation in an emergency and is unable to secure either an anesthetist or an assistant.

3. The proper method when a general anesthetic is contraindicated.

4. As the operation is practically bloodless, it permits a clear examination of the orbit, if such is indicated.

Contraindications: Up to 16 years of age it is best to use a general anesthetic. During the period when these 12 enucleations were done, in one case only, was a general anesthetic used, and that was a boy 9 years of age.

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NEW VESSEL FORMATION IN THE VITREOUS.

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The new formed vessels, arising from the optic disc, were found after a disturbance of vision, said to have been caused by retinal hemorrhage. Similar cases are cited from the literature. It is concluded that such vessel formations are due in most cases to either lues or tuberculosis.

Vessel formation in the vitreous is rare, especially when unassociated with fundus lesions. It is usually ascribed to retinal hemorrhages into the vitreous, or to some retinochoroidal in-

1924, complaining of diminished vision in his left eye. He said he had been an aviator during the war, but had been refused admission to the Aviation Squad of the State National Guard of

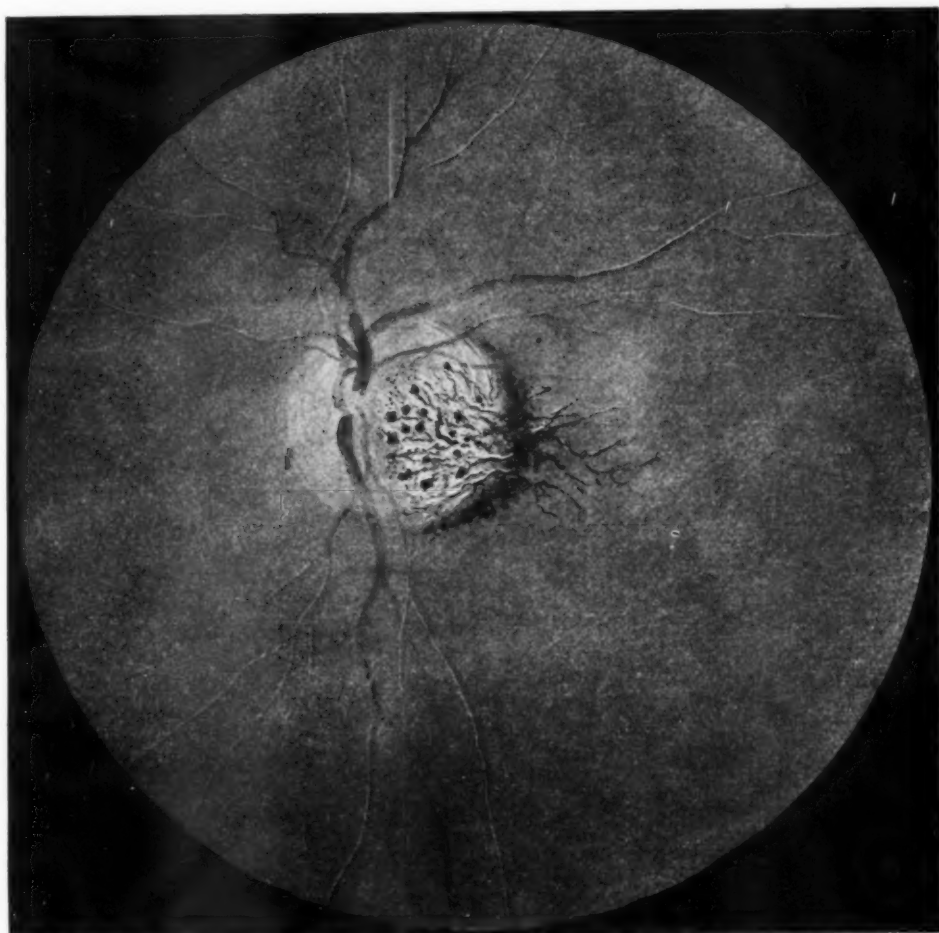


Fig. 1. Pigmentation in front of optic disc and small vessels extending forward into vitreous.

flammation, the supposed etiologic factors being either lues or tuberculosis. Such vessels commonly arise from the disc, in which case there is no connection with the peripheral retinal circulation, tho some observations have been reported coming from the latter.

Case History: R. B., aged 26 years, came for examination October 12th,

Pennsylvania because the vision in the left eye was diminished. He had no other symptoms referable to that eye.

Past history was negative except that two years previously, while working in a New York office, he noticed a slight haze before his left eye while reading or concentrating on an object. At that time he was told that he had an

intraocular hemorrhage. Glasses were given and potassium iodid prescribed internally.

Family history revealed an absence of tuberculosis and carcinoma.

Examination: Vision O. D. was 20/15; O. S. 20/40. External examination was negative. Muscle balance was normal. Ophthalmoscopy showed O. D. media clear, disc well defined, round and good color. Macula, periphery and vessels were negative. O. S. slight lenticular opacity in the form of linear dots posterior and to the nasal side of the center of the lens. The rest of the media was clear. The first appearance of the fundus gave one the impression of a small dotted hemorrhage in front of the disc. On closer examination, however, the latter was well outlined, but showed some pigment deposit along the temporal edge, from which there arose several small vessels which proceeded forward into the vitreous for about two diopters distance. Along these vessels and at their ends were several irregularly round, serrated, red shaped areas, resembling small spheres. The entire formation simulated a small twig of a tree, with numerous rounded off shoots. On close inspection these latter were seen to be convolutions of minute vessels.

Patient denied venereal infection. Wassermann reaction was negative, while nose and throat examinations were normal.

Harlan¹ in 1889 reported a case, giving a history of severe iritis in 1886. First seen in 1887 and observed at intervals since then, the right fundus showed a meshwork of vessels springing from the disc and proceeding outward into the vitreous at an angle of 45°. There were areas of old hemorrhagic spots in the macular region.

Later acute hemorrhages were seen in other parts of the fundus, while a keratitis punctata developed. The left fundus also showed a similar hemorrhagic condition, but not so extensive. At first there was no vitreous haze or apparent supporting framework, but these appeared later.

deSchweinitz² said cases are occasionally seen with new blood vessel formation in the vitreous in front of

the entrance of the optic nerve. Only a few vessels may be present or there may be several, masking the nerve-head and having no connection with the retinal vessels.

These vessels may be due to retinal or vitreous hemorrhages. In other cases lues and tuberculosis may be etiologic factors.

According to the American Encyclopedia of Ophthalmology³ the development of new vitreous vessels is uncommon, and they usually arise from the disc, altho some cases have been seen with vessels coming from the periphery. In general, new vitreous vessels proceed forward as fine convoluted branches, and then form loops returning to the disc. Most cases occur in luetic patients, a few of which have had hemorrhages into the vitreous.

One instance was reported of an attempted suicide who developed severe papillitis and vitreous hemorrhages, followed by the appearance of vitreous vessels with a large opaque mass at the posterior pole.

Hirschberg⁴ reported a case with connective tissue mass covering the disc, and new vessels in the shape of a fly's wing extending upward and inward. Antiluetic treatment was advised for all cases of this type.

Burzel⁵ examined a boy with vitreous vessel formation and opacities, who gave a positive skin reaction to tuberculin. On the other hand Beatson-Hird's⁶ case, a boy eleven years old who had new blood vessels extending forward into the vitreous and terminating in some grayish fibrous tissue, had negative tuberculin and Wassermann tests.

Dunn⁷ followed a case for a period of one year during which time the vitreous twice became so full of opacities as to greatly obscure the vision. The right eye showed two masses of glistening semitransparent exudate, filled with vessels varying in size from the finest retinal twigs to those of larger caliber. Some ended in knobs, which apparently came from stalks as large or larger than retinal veins. These stalks in turn seemed to be derived from retinal veins. There were also a few hemorrhages present. The

dust like opacities above mentioned disappeared under mercury and potassium iodid.

Loring⁸ thought new vessel formation in the vitreous was not so rare as most writers believed it to be. At times these vessels give the impression of being primary, with no supporting network, unless the closest inspection be employed. He was of the opinion that they were inflammatory in origin and due to some form of retinitis. Leber suggested they were due to repeated hemorrhages which in time became organized.

Frost⁹ described a case, fifty-four years of age, first seen in June, 1889, because of defective vision in the right eye. Ophthalmoscopy showed several of the fundus vessels lined with white bands, while some of the smaller ones were mere streaks. There was a small macular hemorrhage and a feathery shaped one below. Springing from the disc were numerous fine vessels, terminating in tufts or balls at about two diopters anterior to the disc. Some of these tufts simulated hemorrhages, while others seemed more like fine coils of vessels. Later the vitreous became hazy and then cleared again. Examination in 1892 showed what was evidently a strand of proliferating retinitis above the disc.

In reviewing the literature on new vessel formation in the vitreous, by the

quoted authorities, it is noted that hemorrhages and exudate were nearly always present where case reports were given. An inflammatory process, either luetic or tubercular, was the accepted etiologic factor, producing in the final analysis a proliferating retinitis. The case here reported showed neither hemorrhages nor exudate, altho there was some probability of the former having been present two years before my examination. The tests for lues and tuberculosis were negative as well as all other examinations, including urine, sinus, and nose and throat. Even tho no supporting framework could be observed, there undoubtedly was some structure which maintained the vessels in their position in the vitreous.

CONCLUSIONS.

1. Most cases of vessel formation in the vitreous are due to either lues or tuberculosis.

2. Retinal hemorrhages and exudate, ending in proliferating retinitis, are usually present.

3. Some supporting fibrous structure, tho not always visible, is necessary for the maintenance of the vessels in their position in the vitreous.

4. The terminal tufts, which at first sight resemble hemorrhages, are minute convoluted coils of fine vessels.

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THREE FRIENDS WHO MADE OPHTHALMIC HISTORY: BOWMAN, DONDERS AND VON GRAEFE.

VIRGIL J. SCHWARTZ, M.D.

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Brief biographic sketches of these three masters of modern ophthalmology are given with especial reference to their mutual relations and friendship. Read before the Minnesota Academy of Ophthalmology and Oto-Laryngology.

A great event was taking place in Hyde Park, London, in the year 1851. It was the occasion of the first great world's fair, held in a huge glass building, the original Crystal Palace. Thither had come visitors from all parts of the world, persons of various stations in life, filled with curiosity and eager to see the widely heralded exposition.

Among others who chose to make the journey at this time were two young men, one of whom lived in Holland and the other in Germany. Neither knew that the other existed. Each had a double purpose in going to London, for aside from and perhaps more urgent than the intention to visit the fair was the desire to do some scientific study—for both were engaged in scientific work.

It so happened that both men decided to visit, on the same day, the clinic of a young London ophthalmologist. Thus, then, came about the fateful meeting of Frans Donders of Utrecht, Holland, Albrecht von Graefe of Berlin, and William Bowman of London—the first originally a physiologist, the second from the start a clinician, and the third beginning as an anatomist. Had these three not lived—indeed, had they lived and worked without having met each other—the story of ophthalmology would have been a far different one. The welfare of the entire world was affected. Quite possibly we should not be here at this moment, discussing any of them. The reason for this, briefly stated, is as follows: Each of these three men was to the other a guide and an inspiration to constantly greater achievement. The stimulus received, one from the other, as well as the aid and advice, were quite indispensable to the maintenance of the fire of scientific zeal which burned within each of them. But most important of all the ties which bound them was the tie of friendship—of inti-

mate, faithful, undying friendship. This, together with an unswerving loyalty, a fervid devotion, a deep sympathy, a mutual respect and admiration that was unbounded, formed such a bond of union, strengthened by frequent visits and correspondence, as might inspire even those of less intrinsic ability to meritorious achievement.

John Eddowes Bowman lived in the town of Nantwich, county Chester, in western England and somewhat to the north. Nantwich is now a town of about seven thousand people, but in 1816 it was only a small, picturesque, typical old English community. John Bowman was a banker by vocation and a botanist and geologist by avocation; in fact, so absorbed did he become in the latter that during his later years he seriously neglected his business. Nevertheless he maintained a home of intelligence and refinement, as attested, in some degree, by the fact that all his four sons made honorable and notable records in their professions.

The third of these sons, William, was born July the twentieth, 1816. Ten years later, together with his two older brothers, he was sent to a Mr. Hill's school, not far from Birmingham, and while here he made an excellent record, both in his studies and in matters requiring manual dexterity. These traits are of considerable importance because they characterized his work thruout his life.

A short time later he suffered an injury to one hand and his boyish mind was so deeply impressed by the pleasant manner and efficient treatment of Mr. Joseph Hodgson, a surgeon of the Birmingham General Hospital, that it is said to have motivated him to enter also the study of medicine and surgery. Accordingly, when fifteen or sixteen years old he became apprenticed to this same Mr. Hodgson—a good teacher and a sincere man—at

the Birmingham General Hospital for a period of four or five years. Here his first two years were spent almost entirely in studying anatomy and physiology, and later he began to devote himself to pathology and surgery. He worked hard and long while in the hospital, including in his unusually complete case records, both ante- and postmortem, a number of drawings in pen and in color, so good that they were later published.

Doctor Burton Chance of Philadelphia, to whom I am indebted for a number of facts presented herein, states in his excellent memoir of William Bowman, that among other activities during his stay in Birmingham, Bowman made a number of measurements of the heart orifices which so pleased a friend of his that the latter presented him with what was at that time a fine microscope. This gift was a milestone in his career, for it furnished a strong incentive to the microscopic study and research which was to make him famous.

When about twenty years old he went to King's College in London for further study, becoming a sort of teaching fellow in physiology a year later. He then went on a tour of the continent, paying particular attention to the hospitals of Austria, Germany, France and Holland. On his return he was appointed junior demonstrator in anatomy at King's College. His interest lay especially in histology, and he tried hard to induce his students to purchase microscopes. However, these were very expensive, so that few could afford them. Later, therefore, he arranged to import some from France where they were being made much more cheaply and in greater numbers.

When twenty-three years old he passed his preliminary examinations for the Royal College of Surgeons, and five years later he was made a fellow. At twenty-four he became assistant surgeon, and a number of years later full surgeon at King's College Hospital, altho he did not fill this appointment actively for a very long time. For three years he worked assiduously at histologic and surgical research, producing momentous papers on the structure of striated muscle and

of the kidney, including the idea that the Malpighian bodies separate the watery portion of the urine from the blood. Sufficiently important were these to win him, at the age of twenty-five, a membership in the Royal Society, and the following year, the Royal Medal of this society. Just previous to this, he had already written the article on general surgery for the "Encyclopedia Metropolitana," and had begun a study of the mucosa of the alimentary tract for the "Cyclopedia of Anatomy and Physiology."

When twenty-seven years old the first of the five parts of "The Physiological Anatomy and Physiology of Man," his epoch making work written in collaboration with Todd, made its appearance. Originally illustrated, clearly written and presenting hitherto unpublished, indeed unknown, histologic facts, it was destined to form the foundation of much of the histology which is taught today. Its value was further enhanced by a correlation of histology and physiology thruout the series.

Achievement enough, you will admit, for a boy in his twenties!

At thirty-two he was elected to the chair of Physiology and General and Morbid Anatomy at King's College. Two years previously he had become an assistant surgeon at the Royal London Ophthalmic Hospital, Moorfields, after deciding to enter ophthalmology, and so completely reversing his original plans to continue in the fundamental sciences and general surgery. After five years as assistant he followed Dalrymple as full surgeon, and began at the same time to build up a great private practice and clinical reputation. Later he helped Florence Nightingale to develop a systematic course of training for nurses. Pursuant to a provision of the English law he was obliged to relinquish his Moorfield's position when he reached the age of sixty, after twenty-five years in its service, despite the efforts of friends to make his case an exception.

A year after beginning his assistantship at Moorfields he read one of his first and probably most important contributions to ophthalmology, wherein he described the anatomy, histology

and physiology of the ciliary muscle, the retina and the cornea, and with it the first account of the now well-known Bowman's membrane, or the anterior elastic lamina, and Bowman's tubes, or corneal interspaces. Brücke, in 1846, had discovered the meridional fibers of the ciliary muscle; Bowman in 1847, discovered independently both the meridional and the radial fibers, and so helped to solve the mystery of accommodation.

Followed then a veritable deluge of original papers and discoveries: the relief of epiphora and lacrimal obstructions by dilating the punctum, slitting the canaliculus with his special knife, the use of his probes, and the division of strictures with his lancet; the simultaneous use of two needles in capsular cataract; the operative treatment of conical cornea, and of detached retina; various instruments for cataract extraction, especially the lens spoon, also a suction syringe for soft cataract; a number of iris instruments for making artificial pupils; an operation for ptosis, drawing up a group of fibers from the obicularis to the eyebrow; the first correct description of zonular cataract and of the retinal membrana limitans; the introduction of skiascopy in astigmatism and conical cornea; and the indication of the degree of intraocular tension by using the symbols Tn, Tl, T2 and so on. Some of these events preceded his meeting with Donders and von Graefe, in 1851, but most of them followed it, in great measure resulting from the stimulus and friendship of his two colleagues.

For more than thirty-five years Bowman maintained his tremendous success. During his later years, one after another the greatest honors in the ophthalmologic world were showered upon him: at forty-one, the doctorate of medicine by Dublin University, and later, the doctorate of laws by both Cambridge and Edinburgh Universities; for three consecutive years the first presidency of the Ophthalmological Society of the United Kingdom; and most important of all, to him, the presidency of the Ophthalmic Section of the Seventh International Medical Congress.

A few years after he relinquished his

position at Moorfields he began gradually to withdraw from his various activities in the city to his country home and gardens in the hills of county Surrey, southwest of London. He had by this time, despite constant giving and great charity toward many of his patients, accumulated a fortune of more than half-a-million dollars. This he now proceeded to enjoy with his wife and seven children, at times also with his grandchildren, in the quiet, simple, almost stoic manner which had always been his mode of life. He was much intrigued by the beauty of his flowers, with which he spent a great deal of his summer leisure. He was not a hearty eater, drank very little, smoked not at all, and rose early, being always business like and prompt. He was small, slender and rather pale tho rarely ill, and always dressed in black,—doubtless a manifestation of his deeply religious nature. A steady hand, an even temper, a tendency to do one thing at a time and that well, a keen observation and a charitable, courteous, considerate nature—all were among his attributes.

Two additional honors were yet to be bestowed upon him: in recognition of his services to ophthalmology, a lectureship was established, known as the "Bowman Lecture" [read by an American (Dr. de Schweinitz) for the first time in 1923]; while a short time later, in recognition of his services to science in general, he was made a baronet.

On March 29, 1892, then, at the age of seventy-six, leaving behind him a long and brilliant train of contributions to mankind, Sir William Bowman quietly passed away.

At Tilburg, a woolen manufacturing city of about sixty thousand in the province of North Brabant, in southern Holland near the Belgian line, there lived early in the nineteenth century a tradesman named Donders. He had nine children—eight girls and a boy—and this boy, born May 27, 1818, was named Frans Cornelius Donders. The father unfortunately died the next year, but the mother was able to direct the children's education for a time thereafter, sending her son to a school at Boxmeer when he was about twelve,

and planning all the while to have him study theology for the ministry. The boy tried, too, but this was so contrary to his natural tendency toward science that at last he gave it up, and at the age of seventeen, he entered the medico-military department of the University of Utrecht. This was one of the oldest and best of the continental schools, having been founded in 1634—two hundred years before his time—so that he was able to receive an excellent early training here. A few years later he continued his studies in the town of Flushing, or Vlissingen, on the North Sea coast, and after that at the Hague, finally receiving his degree in medicine at Leyden University, at the age of twenty-two.

Thus we find Donders, like Bowman, beginning his career as a general surgeon. Similarly, too, his interest and researches in the physiology and anatomy of the eye, together with frequent requests for advice in the clinical application of physiologic optics, drew him gradually but surely into the field of ophthalmology as a profession.

At twenty-four he became a lecturer in anatomy and physiology at Utrecht, and six years later he was made professor of these subjects. During this time he made important contributions on the motility of the human eye, on *muscae volitantes*, on the use of prismatic lenses in the treatment of strabismus, on corneal regeneration, and on the relation between accommodation and convergence—all fundamentals in our present conception of ophthalmology.

When he was thirty-three he went to London, and formed there the tremendously significant friendship with Bowman and von Graefe which encouraged him to a far greater achievement afterward. I refer to his opus maximum, "The Anomalies of Refraction and Accommodation," which was published in English, not in Dutch, in 1864, when he was forty-six years of age. If he had done nothing else, this one volume would have been enough to make him absolutely indispensable to the world at large and to ophthalmology in particular, for can anyone conceive how infinite and merciful has

been the use of glasses for the relief of asthenopia?

Shortly after his return from London he became professor of ophthalmology at Utrecht. A few years before he had become editor of the "*Nederlandsch Lancet*"; now he founded the *Netherlandish Hospital for Eye Diseases*, but continued active research in the field of general physiology. He followed van der Kolk as professor of physiology at Utrecht, establishing at the age of forty-eight, a physiologic laboratory which became a model for others of its kind, and in which much of his research was done. One of the first problems he worked out here was the measurement of the reaction time of a psychical process. He made important discoveries in the anatomy of the larynx and the physiology of speech. Concurrently with Kussmaul and others he made observations on the physiology of sleep which convinced him that there were changes of caliber in the cerebral vessels—rhythmic contractions of the vessels of the brain and the pia mater—indicating that these vessels are controlled by vasomotor nerves, like other vessels. From this he deduced, then, an anemia of the brain during sleep, an assumption later verified by ophthalmoscopic examination of the retina. Some years previously he had written on heat production in plants and animals by metabolism. He studied the movements of the heart and lungs in respiration, and the effects of atmospheric pressure on the heart function. Remember, then, that all these epochal discoveries in the field of general physiology were made by a man whose fame rests principally upon his work in ophthalmology!

The latter field furnished him material for many other papers, written in Dutch, German, English or French with equal facility: on hyperopia, on ametropia and its sequelae, on astigmatism and cylindrical lenses (this paper dedicated to von Graefe), on the action of miotics and mydriatics, on the effect of accommodation in the determination of distance, on binocular vision and the recognition of the third dimension, on the color sense, on convergence and accommodation in birds, on the functions of the eye muscles,

and on the relation between strabismus and errors of refraction. In addition he devised a number of ophthalmic instruments and appliances, including his isoscope, his pseudoisochromatic wools, his reduced eye, and most important of all, his ophthalmotonometer. Also he was the first to describe retinitis pigmentosa and nyctalopia, and also was the first to note that the arterial and venous pulse of the disc, which his friend von Graefe had noted in glaucoma, could be easily reproduced in a normal eye by pressure with the fingers on the eyeball. Further, he was an associate editor of von Graefe's "Archiv."

It is difficult for us to comprehend how one man—one single brain—could contribute so much to humanity! More difficult still was it for his contemporaries to recognize in some fitting way his service to the world. A modicum of recognition came to him in the form of an honorary doctorate of laws from Cambridge University. Further, on his seventieth birthday he was given a great festival by the people of Utrecht, its happiness being somewhat clouded by the fact that he was now forced by law to relinquish his teaching post.

Donders was a man of larger stature than Bowman, with pleasant, round features, but like the latter he was quiet and reserved, of charming, magnetic personality and polished manner. He was a restraining, deliberate counsellor and a warm, faithful friend—unaffected, unbiased and unselfish. Little wonder is there that so powerful an attachment should have sprung up between Bowman, von Graefe and himself. Bowman's last publication was a biography of Donders in which he pays such a glowing tribute to Donders as only an admiring, devoted friend can do. Stronger yet was Donders' intimacy with von Graefe; each felt the other's deepest emotions—each suffered the other's sorrows and shared his joys. Many visits back and forth between Utrecht and Berlin, and a steady correspondence, served but to increase the intimacy. Donders saved and treasured all von Graefe's letters, but he finally made a gift of them to the Graefe museum and so to posterity. Aside from his relations with Bow-

man and von Graefe, Donders' life was largely dedicated to his only daughter, who was married to Dr. Theodor Engelmann in 1869. When she died, the following year, von Graefe was also on his death bed; who can say what anguish of heart and soul must have racked poor Donders?

Not long after his memorable seventieth birthday, Donders again visited London. While there he suddenly lost his power of speech, then his memory and finally his consciousness. At last, on March 24, 1889, Frans Donders became a memory.

We come now to the third and probably the most colorful, while at the same time the most tragic, of the three lives which we have to consider. We are again reminded that it is not the longest life which shows the greatest record, for the subject of this sketch lived but forty-two years, and much of this was spent in illness; yet what undying glory illumines his name!

About a hundred years ago there lived in Berlin a famous general surgeon and ophthalmologist, Karl Ferdinand von Graefe by name. On the twenty-second of May, 1828, a son came to him, and this son was named Albrecht. The boy received his first schooling in Berlin, showing an early preference for mathematics. This, however, was gradually supplanted by an interest in natural science, so that finally he decided to study medicine at the University of Berlin. What aptitude he displayed in this field may be imagined on learning that at the age of nineteen he received his medical degree. At that time Ferdinand von Arlt of Prague was one of the greatest continental ophthalmologists, and to him young von Graefe went for instruction, intending to study general surgery elsewhere, later. Von Arlt, however, noting his pupil's great brilliancy in his own field, persuaded von Graefe to limit himself henceforth to ophthalmology. Doctor Thomas H. Shastid, in the American Encyclopedia of Ophthalmology, and Doctor Fielding H. Garrison in his "History of Medicine," both of whose articles I wish to acknowledge gratefully in the preparation of these pages, are agreed that the world owes von Graefe's mar-

velous achievements in great part to von Arlt; for the latter pleaded and argued with von Graefe to change his plans and drop general surgery, and finally von Graefe did so. The young man proceeded then to gather by contact as much ophthalmologic knowledge as he could. Accordingly, from Arlt he went to Sichel and Desmarres in Paris for two years; thence to the two von Jaegers in Vienna; later to various teachers in Dublin and Edinburgh; and finally to Critchett and Bowman in London. This last was the occasion of his first meeting with Bowman and Donders, and formed the spark which touched off a veritable blaze of creative fire in all three, and especially in von Graefe. He was now only twenty-three years old; Donders was thirty-three and Bowman was thirty-five. Yet such differences in age were not the slightest bar to that union, for they already had too much in common!

Shortly after this von Graefe returned to Berlin and began to engage in the private practice of ophthalmology. His reputation spread quickly and he soon developed a great professional following, so much so, in fact, that he opened a private institution for the treatment of eye diseases. Many later clinics in Germany and Switzerland were patterned after this one. At twenty-four he became privat-docent in ophthalmology at the University of Berlin, with a thesis on the mechanism of the eye muscles. Just at this time, too, von Helmholtz had invented the ophthalmoscope, and von Graefe was quick to apply it in his clinical work; with it, for instance, he made the first diagnosis of embolism of the central artery, and later a description of choked disc. He also submitted the idea that in diseases of the brain which are followed by partial or total loss of vision, the latter is due not to a so-called primary "paralysis" of the optic nerve, but to an actual optic neuritis.

When twenty-six years old he laid the cornerstone for the monumental work which to this day towers above others of its kind—von Graefe's "Archives of Ophthalmology." Most of his own writings appeared in this journal, beginning with disturbances of the ob-

lique muscles and continuing with tremendously important studies in glaucoma; then followed keratoconus, mydriasis, diphtheria of the conjunctiva, and great improvement of the strabismus operations, with a note on diplopia following these operations. He became also, in a measure, an authority on diseases of the brain, and as already suggested, was the first to correlate properly ocular pathology with brain and nerve conditions—as, for instance, choked disc with brain tumor. He devised the linear extraction of cataract, placing the incision in the sclera as near to the iris as possible to avoid gaping of the wound, and for this purpose he invented the now well-known von Graefe knife.

In an operative way, however, his greatest achievement, even more enduring and far reaching than that in strabismus and in cataract, was the introduction of iridectomy in the treatment of iritis, iridocyclitis and glaucoma. The operation itself was invented by Joseph Beer, his former teacher, in 1798, but von Graefe, at the age of twenty-eight, startled the medical and the lay world by his phenomenal results in the relief of glaucoma thru the employment of this same operation. He had previously found that staphylomata of the cornea receded after iridectomy, probably because of the reduction in intraocular tension, and so he determined to try the same procedure in glaucoma—and with what result! As with Donders and his work on refraction, von Graefe would not have had to contribute another thing to medicine in order to win for himself everlasting glory.

However, his fertile brain produced much more than has already been enumerated. Our present knowledge of sympathetic ophthalmia originated with him, as well as much of the symptomatology of ocular paralysis. In his study of exophthalmic goiter, he called attention for the first time to the lagging of the upper lid—the so-called "Graefe sign"—when the eyeball is moved down. He made important observations on the visual field in glaucoma and in amblyopia, and also on perimetry in general and ophthalmic diagnosis. He made reports on the

value of unilateral cataract extraction, on muscular asthenopia, and on progressive myopia. Von Jaeger had stated that the optic nervehead in glaucoma was swollen and puffy; von Graefe, however, after first making the same error, corrected this notion by asserting that the condition was one of excavation, and called attention to the arterial and venous pulses here visible.

When still but thirty years old he became an associate professor of ophthalmology at Berlin University, and eight years later a full professor at the same institution. To his classes and clinics flocked students and practitioners from all over the world, particularly those interested chiefly in the clinical and surgical side of ophthalmology. Being at best a man of frail constitution, von Graefe's health began to give way early—even at thirty pleurisy and hemoptysis gave him much trouble—and it grew gradually worse as his countless activities increased. At about this time, also, his mother died—she who had mothered him in his manhood with almost as much tenderness as in childhood.

When he was thirty-three he was betrothed to the Danish countess Knuth, and shortly afterward left for Heidelberg to meet Donders. On the way, however (at Baden-Baden), he became seriously ill, so that only after a protracted convalescence was he able to resume his work. Two years later he was married, and the first part of his married life was happy, indeed; but in the third year he was again stricken with grief at the death of his baby

daughter. After that there came to him another little daughter and a son, to compensate for what he had lost.

Despite his sorrows and his illnesses, von Graefe was pleasant, courteous, refined and gentle, and he had a keen sense of humor, even to playing practical jokes and pranks. He was, to use the vernacular, a "regular fellow." He was idolized by royalty and by beggars. No man was too rich and none too poor to receive from him the best he could give, without thought of reward.

Von Graefe's devotion to and affection for Donders was something which it is difficult for us fully to appreciate. The reverse was probably equally true, but the letters which Donders preserved and which were described six years ago by Dr. van Herwerden prove at least that the inspiration and spiritual exhilaration which von Graefe derived from his friend was little short of sublime. Moreover, his feeling of inferiority and subordination in scientific matters as compared with Donders, and in a measure with Bowman, also, remained with him to the end of his days. On July 20, 1870, at the age of only forty-two, that end came.

Thus we conclude our story of three great lives—lives of sacrifice, of charity, of love, of devotion, of honor and of service. If it be true, as some maintain, that service is the greatest single factor in life, then it is also true that the debt of humanity to these three men will never be fully absolved.

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NOTES, CASES, INSTRUMENTS

TRAUMATIC IRIDODIALYSIS; SPONTANEOUS RECOVERY.

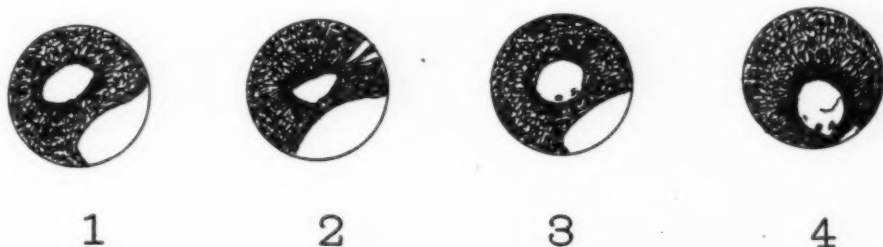
ALEXANDER DUANE, M.D.

NEW YORK.

Spontaneous cure of a traumatic iridodialysis is unusual. Wagenmann in his volume on eye injuries in the Graefe-Saemisch Handbuch could discover only a few cases that had been reported. In these the cure was sup-

He was placed in the hospital and atropin with complete rest was ordered.

During that night and on several nights thereafter there were repeated hemorrhages filling the anterior chamber and accompanied by pain. These persisted in spite of cold applications, and elevation of the head. They were finally stopped, apparently as the result of two injections of 5 c.c. of thromboplastin.



Figs. 1-4. Injury of left eye from B.B. shot fired from an air rifle 30 or 40 feet away. Shot impinging on lower and outer aspect of globe. Later it was extruded spontaneously. 1. Aug. 27, three days after injury. Iridodialysis; displaced and oval pupil; moderate amount of blood in lower inner part of anterior chamber. That night and for several nights afterward, repeated, rather large hemorrhages into anterior chamber. 2. Sept. 22. Pupil approaching normal position. (Drawing shows several apparent rifts in iris. These not seen later). 3. Oct. 30, pupil nearly central; iridodialysis smaller. Two pigment tendrils in lower part of pupil. 4. Jan. 7. Pupil drawn down below its normal place and pigment tendrils drawn down with it. Iridodialysis reduced to a small chink at the limbus. Visible only on careful inspection, being filled with black pigment and impermeable to light. Interior of eye normal, pupil dilates fairly under homatropin.

posedly aided by energetic atropinization. In the case subjoined this certainly played no part.

On Aug. 24, 1925, R. C. M., a boy, aged 10, was hit in the left eye by a B.B. shot fired from an air rifle on the other side of the street. On the 27th he was brought by automobile to New York, and I saw him immediately after the five hours journey. Inspection showed no visible wound and no evidences of inflammatory reaction. The iris had the appearance shown in Fig. 1. There were slight remains of hemorrhage in the lower inner part of the anterior chamber. Examination with X-ray showed the bullet to be impinging on the lower outer portion of the eyeball, about 4 mm. in front of the equator. There was no pain. No precise visual tests were made, but he could distinguish large objects, and the projection was normal.

On the 31st the bullet was spontaneously extruded.

Left the hospital on September 12th. The hemorrhage gradually absorbed. No atropin was used after leaving the hospital. The further course up to January 7, 1926 is shown in the drawings. On January 7th, iridodialysis reduced to an almost invisible chink at the limbus, filled with pigment and impervious to light. Pupil drawn down below its normal position. Exterior otherwise normal. Media clear. No abnormality in fundus. V. 19/100. There seems to be a faint central scotoma, not absolute.

The spontaneous cure in this case I attribute to the repeated hemorrhages forming a fibrinous exudate whose continuous traction gradually drew down the detached iris and glued it into place.

The central scotoma, which I think

accounts for the comparatively poor vision, I should regard as the result of fine changes in the macular region produced by the concussion.

143 E. 35th St.

MASSIVE EXUDATIVE RETINITIS AND ANGIOMATOSIS RETINAE.

DAVID ALPERIN, M.D.

BROOKLYN, N. Y.

C. B., age 34, white male, chart No. A.-16870 N. Y. P. G. Hosp., presented himself at the eye clinic on Feb. 18th, 1925, complaining that he could not see well with his left eye.

History. While delivering ammunition, during the war, a shell exploded near him, and the flash blinded him temporarily. Family and personal history irrelevant. External appearance of the eye normal, media clear, pupil reacts to light both directly and consensually, associated movements normal. Pupils dilated showing no adhesions. Fundus examination revealed an extensive periphlebitic exudate extending from the disc to the extreme periphery, running all along the superior temporal vein and surrounding area. Thruout this area were seen red and gray spots interspersed. On the vein and underneath it and hanging down a lobular, purple, pea sized vascular tumor clearly defined, with no pigment around, could be seen. Disc color normal and the retinal vessels normal except in the region of the exudate where the vein would disappear in spots. Blood Wassermann negative, subcutaneous injection with 0.002 gm. old tuberculin gave a local but no focal reaction or general reaction. No cholesterin crystals were seen. Vision: right eye 20/40; left eye 20/50; with correction O. D. 20/25; O. S. 20/40-1.

Patient was sent for a general physical examination, report reading as follows: blood pressure 115/70; heart, lungs, and digestive system negative. Urinary findings negative. Rhinolaryngologist reported possible focal infection from diseased tonsils, which

were removed. X-ray of sinuses and teeth were negative. Patient was put on therapeutic doses of old tuberculin beginning with 2 m. of the serial dilution No. 1 (0.001 mgm.). In the absence of focal or general reaction the dose was increased weekly by 2 m. of the same serial dilution. On this treatment he was kept for about three months with no change in the exudate or vascular tumor. He was then put on protoiodid of Hg. 0.01 gm. t. i. d. and potassium iodid, gradually increasing doses. At present he is under observation, continuing the same treatment.

Often cases of retinitis occur in which it is not possible to determine, with any definiteness, the etiologic factor. This case would resemble a retinitis circinata but the exudate does not follow the macular superior and inferior temporal vessels. We believe this retinitis to be more of the massive type as described by Coats. The red spots look like aneurysmal enlargements of the retinal vessels, and the cherry color, pea sized, lobulated tumor protruding into the vitreous below the vessel looks like a large aneurysm containing clotted blood.

It will be interesting to watch the patient for further possible change in the fundus picture. Ditroi's case of angiomas, three and half years later, developed opacity of the retina and showed diffuse glial proliferation with constriction of vessels. The angiomatic nodules had increased in size, fine glistening spots had appeared in the macula and vision had decreased. Myake reports two cases of retinal degeneration with multiple miliary aneurysms (angioma fibroangiomasum retinae) one of which, from the description, resembles very much the case here described. He assumes the cause to be due to a special affection of the peripheral vessels; he describes the condition as follows: Infiltration around moderately dilated vessels, producing disturbance of nutrition and degeneration of retina. In the temporal periphery, vessels were studded with small aneurysms, a long white opacity extending from the disc to the peri-

phery. In the first case, the right eye of a boy 16 years of age, showed a large irregular white opacity, and several small ones lying behind vessels most of which were normal. In the temporal periphery vessels were studded with small aneurysms. The other patient: Left eye contained a long white opacity extending from the disc to the periphery and bordered by numerous small white opacities at the edge. Above the disc small white spots were disseminated over a long area, and small aneurysms, tortuous vessels were seen along the upper and lower nasal vessels.

Dodd reports a case of a boy 14 years of age with a retinal exudate and aneurysmal dilatations.

The etiology in all these cases is more or less obscure, and I believe that a toxic condition is at the bottom of their pathology. The assumption of a toxemia is justified in that it explains the injury to the vascular walls, causing exudates and retinal degenerations, as well as aneurysmal enlargements of vessels. Foreign protein therapy, I believe, may be used empirically with success.

750 Greene Ave.

LUMINAL POISONING WITH CONJUNCTIVAL RESIDUE.

JESSE H. ROTH, M.D.

KANKAKEE, ILL.

This patient was first seen by Dr. Edwin S. Hamilton with the following history and findings. One pregnancy in 1911, which terminated at the third month from unknown cause. Since that time she has had "female trouble." Since 1917 she has had attacks of unconsciousness of undetermined origin which have the following characteristics:

1. Always at night
2. No aura
3. One to two hours duration
4. Involuntaries frequent
5. Followed by severe headaches which last 24 hours.

She has treated with a large number

of doctors, both regular and otherwise, without results. A Wassermann taken in 1920 was negative.

HISTORY OF PRESENT CONDITION.

October 21, 1924. She went to a new doctor who gave her two kinds of medicine for her "spells." One of these was later found to be luminal which was taken in $1\frac{1}{2}$ grain doses four times daily. On November 6th she noticed a peculiar rash on her face and body and felt sick all over. She returned to her doctor who told her that she had the grippe and gave her some large white tablets—later found to be aspirin—and some "cold" tablets. However, she became gradually worse with general malaise, sore mouth and redness over the entire body, so she returned to the doctor on November 9th. He did very little for her and on the day following she came under our observation. Her complaint at that time was; An eruption over the whole body which itched intensely; sore mouth; swollen face; purulent discharge from the eyes; and a general feeling of being sick. Her appearance at that time was so abnormal that she was not recognized by people who had known her for years.

Upon examination it was found that she had a temperature of 100 and a pulse of 102. Her entire body including the face and extremities was covered with a slightly raised erythematous rash, dark red in color and itching intensely. The eyes showed marked conjunctivitis, with the lashes and lid margins agglutinated. Mouth,—the mucous membrane lining the inner surface of the cheeks and covering the entire tongue as well as the palate and the pharynx was studded with little blisters some of which had ruptured leaving shreds of mucous membrane in the mouth. Leucocyte count was 8,600. Urine showed a sp. gr. of 1018, no albumin or sugar. Diagnosis at that time was a dermatitis either from medicine or food. All medication was stopped and she was sent home to bed under the following treatment: Potassium chlorat mouth wash; Argyrol 10 per cent for the eyes; Calamine lotion to the skin; Citrocarbonate one dram

every two hours. The following day vesicles made their appearance over the entire body. They varied in size from one to ten centimeters in diameter, were irregular in shape and filled with clear serous fluid. At that time the diagnosis of exfoliative dermatitis was made and consultation advised. This was held the following day with the original doctor on the case and he explained that he had been giving luminal, but insisted that the condition was due to food and not the drug. Concurrence was not held with this opinion.

The course of the disease was stormy and long. The condition of the skin with the extreme itching, the raw mouth and later the nasal condition, made the patient not only very uncomfortable but both eating and breathing a very painful process. The entire integument was shed including the finger and toe nails as well as part of the hair. She was left with a pigmented skin. The eyes showed marked conjunctivitis for two weeks. The mucous membrane of the entire mouth and pharynx sloughed off in shreds, and there were times that she could scarcely swallow. The same condition was present in the nose and of course interfered with breathing. The bowels were open at times while at other times there was marked constipation. Occasionally there would be mucous casts passed in the stools. The temperature varied from 100 to 102 and the pulse stayed below 100 most of the time except when she became very "nervous." The heart and lungs were excellent at all times and in spite of the severe nature of the disease at no time was there any albumin found in the urine and the amount voided was about 2000 c.c. daily. About December first, she sat up for the first time,—this was about three weeks after the onset of the trouble and about a month after she started taking luminal. On December 7th she was able to be up and around the house.

She was examined again on April 2, 1925. At that time she complained that her skin was still mottled in ap-

pearance with splotches of tan between the normal white. She says that there are no subjective symptoms. The ankles are slightly swollen and edematous. The urine shows a sp. gr. of 1018 with no albumin or sugar. Microscopic examination of the sediment shows a few epithelial cells with an occasional pus cell. She was referred to Dr. Roth for her eye condition.

She was seen by Drs. Geiger and Roth May 13th, 1925. Her chief complaint at that time was slight photophobia, smarting and blurring which was not constant and which could be relieved by irrigation of the conjunctival sac. She said that her lashes were usually agglutinated in the mornings. Examination showed the skin about the orbit normal. While there was no displacement of the lashes there was a slight scaly condition of the lid margin. The caruncles showed a slight thickening as is often found in chronic conjunctivitis. The lower and upper fornix showed several adhesions between the palpebral and ocular conjunctiva. The palpebral conjunctiva of both upper and lower lids of both eyes showed dense scars. The scars were not the irregular crisscross variety that is common to trachoma but more the irregular type that has been observed following war gas conjunctivitis. The scars were of irregular geographic type and were not similar in the two eyes. Smears and cultures of the conjunctiva were negative. The corneas were clear and the media and fundi not affected. The refraction showed:

R. 15/40 Minus 0.50 plus 1.00 axis 90 15/15.

L 15/30 Minus 1.50 plus 1.00 axis 90 15/15.

Zinc-boric was prescribed as an astringent treatment but with no effect. May 23 calomel ointment was massaged into the conjunctiva with soothing results. Theosinamin ointment was given her for routine home use. The nose, epipharynx, pharynx, and larynx showed no residue. The patient is still under observation.

Cobb Bldg.

SOCIETY PROCEEDINGS

TWENTIETH SOUTH AFRICAN MEDICAL CONGRESS.

Section on Special Subjects.

PIETRMARITZBURG, July 6-11, 1925.

DR. D. J. WOOD, Presiding.

The Value of the Slit Lamp in Ophthalmic Practice.

DR. D. J. WOOD mentioned the many advantages of this method of examination. He found a distinct difference in aspect of the iritis caused by syphilis or caused by rheumatism.

Retinal Disease Associated with Streptococcal Infection.

DR. D. J. WOOD gave the description of five cases of a particular type of retinitis and presented very fine pictures of the ophthalmoscopic aspect. The cases had several features in common. The ages were under 34; the tonsils or the throat harbored hemolytic streptococci; the onset of the trouble of vision was sudden: the retina showed white spots connected with alterations in the blood vessels and flat detachments: there resulted a permanent loss of part of field of vision. An infection from the tonsils thru the blood is presumed.

Ocular Paresis.

DR. TEMPLE THURSTON read notes on a case of paresis of muscles of the left eye of a middle aged woman. The electric reaction of those muscles was tested and found to give what is known as the myasthenic reaction. In consultation with a nerve specialist the diagnosis was made of myasthenia gravis.

Steel Injury to Eye.

DR. TEMPLE THURSTON also reported the case of a boy with a piece of steel inside the eyeball. A week after the accident the foreign body was extracted thru the sclera by a giant magnet. Sixteen days later signs of irritation of the injured eye and of sympathetic ophthalmia in the second eye were noticed and the first eye removed with good result for the second one. He holds the opinion that localization is not strictly necessary before the extraction with the magnet.

Bailliant's Instruments Used for the Estimation of the Elasticity of the Small Arteries.

DR. A. VERWEY showed the dynamometer and tonometer of Bailliant by the aid of which the diastolic and systolic pressure in the retinal arteries can be estimated. The pulse pressure, i.e., the difference between the systolic and diastolic pressures, is taken as an indicator of the elasticity of the blood vessels. A small difference between the pulse pressure in the brachial artery and in the retinal artery must be considered as a sign of reduced elasticity and as a warning of danger of cerebral hemorrhage in cases with high blood pressure.

Focussing Thru Point-Focal Lenses in Practice.

DR. A. VERWEY thinks that the main advantage of the point-focal lenses is due to a comparatively reduced deviation of the principal ray in the periphery, in a less extent to reduction of the blurring by astigmatism of the oblique pencil. These deviations are causative for faulty localization and apparent movements. The difference between following glance and projecting glance is mentioned; the apparent movements are connected with adjusting movements of the head, while focussing.

Disturbances and Diseases of the Endocrine Glands.

DR. J. WILSON gave a broad description of the general influence of the endocrine glands and emphasized the difficulties arising from the reciprocal relations. A few facts which concern affections of the eyes are beyond doubt, as, the enlargement of the posterior lobe of the pituitary in pregnancy, which may cause temporary hemianopsia and the many manifestations of Graves' disease in the eyes. Further, the influence of the thyroid gland and the pancreas is mentioned and the refraction changes due to endocrine disturbances. The important role of diabetes mellitus to eye trouble is fully acknowledged.

A. VERWEY, Reporter.

**MINNESOTA ACADEMY OF
OPHTHALMOLOGY.**

Sept. 26, 1925.

DR. D. L. TILDERQUIST, Presiding.

Myeloid Chloroma.

DR. N. H. GILLESPIE reported the case of a boy, aged 3 years, with proptosis, swelling of lids, lacrimation, nasal discharge, and disturbance of vision. The illness began four weeks before with complaint of toothache and abscess of a tooth on the upper right side. The parents noticed a bluish discoloration under the lower eyelids at that time, with slight puffiness of the face. After that, swelling of the lids, protruding of eyes, and increased lacrimation set in. These symptoms increased up to the point indicated by the accompanying photograph. There was no pain, the only real handicap being visual disturbance.

The father and mother are living and well. There are seven other children in the family. The oldest boy has a tuberculous knee, but is otherwise well. There is no history of carcinoma, hemophilia, or lues in the family.

The patient's general health is good. He was a full term baby, delivery was normal, he was breast fed and developed normally. He had measles at two years of age and occasionally has had slight colds. He has had no operation or serious accident. Appetite is good. Bowels regular, urination normal. No loss in weight.

Physical examination revealed a well developed, well nourished, three year old boy with marked proptosis and swelling about the eyes and temples; otherwise in apparently perfect physical and mental condition. Temperature was 100°, pulse 90. The eyes showed marked proptosis, swelling, edema, and injection of bulbar and palpebral conjunctiva. There was a greenish serous discharge from the inner canthi. The bulging was due to neoplastic growths in both orbits in the region of the temporal bones, originating beneath the periosteum. Eyegrounds were negative; pupils equal and regular and reacted normally. Ears were normal. Cervical glands were not palpable.

The heart and lungs were negative. There was a nodule 2 or 3 centimeters in diameter in the mid-axillary line on the eighth rib, firm, not tender.

The abdomen was flaccid; spleen not palpable liver and not enlarged.

The extremities were negative. Reflexes were present and normally active thruout. There was no extrinsic paralysis.

There was pallor of the skin and mucous membranes.

Laboratory data: Urine, trace of albumin. Blood, R. B. C. 3,120,000; W. B. C. (Feb. 23, 1923) 31,600; (Feb. 24, 1923), 41,000. Differential: P. M. N. 14%, Lym. 28%, Myelo, 58%; red cells showed variation in size and shape; no nucleated R. B. C.

Diagnosis: Myeloid chloroma.

To classify chloroma as myeloid or lymphatic is difficult in the early stages. It is sometimes interpreted as one or the other by different examiners of blood smears. The predominating factor is the cell formation from the "mother" cell tending to myelocytes or lymphocytes as the disease progresses and the tendency manifests itself.

The significance in the blood picture is not the number of leucocytes but in the findings of embryonic cells, marrow cells from the bone marrow (myeloblasts) which go to form the myelocytes which predominate. The myelogenous type bears the same relation to splenomyelogenous leucemia as the lymphatic type does to lymphatic leucemia.

In acute leucemia, acute myelogenous leucemia and nodular leucemia, the blood picture and symptomatology are much the same as in chloroma, but the tumorous formation showing a predilection for the bones of the head—and particularly the orbits—is favorable to diagnosis of chloroma.

Hodgkin's disease is similar in head picture, but the blood picture differs markedly. In hypernephroma, also, the picture is of a leucemic disease.

Chloroma may occur without visible tumor formation. For example, one case is reported with loss of hearing as the only symptom. The patient died of chloroma and the tumor was found at autopsy in the petrous portion of the temporal bone. There need not be a

leucocytosis, as in a case reported the W. B. C. were 5,000.

Treatment consisted in two exposures of roentgen ray. The first was for twenty minutes with six mil. $9\frac{1}{2}$ sp. gap; twelve inch distance, to front and back of head. The child was taken to its home and when again brought for treatment at the end of one week, the swelling in the eyes had noticeably receded, and the child appeared more comfortable. The second was on March 5th, the exposure was for twenty minutes, the same amount and distance over the spleen and liver. The child was unable to come back at the end of the next week, having grown rapidly worse. Death took place March 14th, about seven weeks from the time the parents noticed the first symptoms. No autopsy was performed.

This case holds additional interest because of its recognition before glandular hyperplasia or liver and spleen enlargement were present; and on account of its high leucocyte count. Most authors report 12,000 as high. I spoke of the greenish discharge from the eyes and nose. The parents called my attention to this. It may be inconsequential, but the disease is known as "green cancer."

Discussion. DR. W. W. LEWIS stated that he had seen two cases of chloroma; the last case was in the City Hospital of St. Paul. It was especially interesting because of the involvement of the jaws. There was enlargement of the mandible and superior maxillary bone until the oral cavity was obliterated. The thickening of the lower jaw and lower maxillary continued until the oral cavity was practically obliterated.

Dr. Lewis said he had seen the autopsy in this case. The meninges had a green kind of cobweb formation all over the brain and the pia. The same green tumor formation was found in the pleural cavity and in the mesentery. The outstanding thing in that case was the enlargement of the bones of the head. They all took part in the enlargement. The bones of the skull enlarged until the head was an enormous size and the sutures all opened. The outstanding finding of the autopsy

was the green cobweb formation in the meninges, the pleural cavity and mesentery.

W. E. CAMP, M.D.
Recorder.

COLLEGE OF PHYSICIANS OF PHILADELPHIA.

Section on Ophthalmology.

January 21, 1926.

DR. T. B. HOLLOWAY, Chairman.

Bilateral Paralysis of the Third and Fourth Nerves.

DR. LEIGHTON F. APPLEMAN exhibited a man with this trouble. At first the paralysis was more complete in the left eye, but within five days the right eye was equally affected. There were ptosis, moderate dilation of rigid pupils and loss of convergence. The patient gave a history of specific infection for which he had previously received treatment. The Wassermann reaction was still positive.

He was placed upon nonspecific therapy and had received one injection of Coley's fluid up to the present time. As the result of this there was a distinct lessening of the ptosis on the left side.

Extensive Nevus of the Eyeball.

DR. WILLIAM ZENTMAYER exhibited the drawings of an extensive nevus of the eyeball in a colored woman, aged 52 years.

In October, 1922, the pigmented area began at a point about "4 o'clock" and encircled the cornea to about "8 o'clock." Except for its chocolate color, it resembled closely a subconjunctival hemorrhage. In two places it had invaded the cornea. The patient said there had been a spot on the eye since birth that had recently been enlarged and causing discomfort.

Malignant change was now thought possible and desiccation or some similar procedure was advised. Dr. William L. Clark, to whom the patient was sent, thought it would be better to wait and see whether it would continue to grow.

The pigment had spread greatly since 1922 and now encircled the cornea except for a small break of 2 mil-

limeters between "12 and 1 o'clock." It had also advanced into the cornea almost around its entire circumference. It seemed also to have extended a little further in the palpebral conjunctiva of the lower lid.

The eye had normal vision and normal fields. The refraction was O. D. -0.25 sph. $\ominus +0.75$ cyl. ax. 150° ; O. S. $+0.25$ sph. $\ominus -0.75$ cyl. ax. 105° . Besides the unusual extent of this nevus, an interesting feature was the increase in size with extension into the cornea after many years of inactivity.

It was hard to determine the nature of the growth without microscopic examination. Probably the term melanosis of the conjunctiva would describe it better.

Sudden Unilateral Blindness Following Injury.

DR. WARREN S. REESE reported the case of a man who was thrown from a motor car on Dec. 19, 1925, and struck his head in the right fronto-temporal region. He was not rendered unconscious, but, on arising, noticed that he could not see with the right eye. When examined two days later he was blind in this eye. There was a sutured laceration thru the skin of the right brow and a smaller one of the lower lid. There was no proptosis, chemosis or subconjunctival hemorrhage. The pupil did not react to direct light but the consensual reflex was normal. A roentgenogram did not show fracture of the orbit.

Dr. Reese considered a fracture of the orbit the most likely cause of the blindness. Another possibility was hemorrhage into the optic nerve sheath. Absence of signs of fracture made this seem more likely. The disturbance of pupillary reflex ruled out malingering. Another possibility was the extension of a subperiosteal hemorrhage back to the optic foramen compressing the optic nerve. Dr. J. Parsons Schaeffer said that this was possible. He also suggested the possibility of hemorrhage into the sphenoid sinus. The patient now has an advanced optic atrophy. There has been no change in the vision or pupillary reactions.

Discussion. DR. WM. ZENTMAYER asked about the condition of the reti-

nal arteries when the patient was first seen. If they were attenuated it was suggestive of a hemorrhage within the sheath of the nerve.

That a fracture at the apex can be produced by a blow on the orbit was shown experimentally some years ago by an English ophthalmologist.

DR. LUTHER C. PETER believed it was possible to rule out subperiosteal hemorrhage for without motor symptoms this would not be apt to produce optic atrophy. On the other hand, it was interesting to note the extensive motor involvement which may follow subperiosteal hemorrhage in the orbit without the presence of an atrophy.

He recalled a case of his in which there was complete internal and external ophthalmoplegia following a blow on the eye from an exploding tire. This patient made a complete recovery with the exception of a slight paralysis of the external rectus. There was no optic atrophy at any time and the central vision and fields remained normal.

He was inclined to think that the blindness and subsequent atrophy were due to damage of the nerve by "contracoup." The roentgen ray examinations of the optic foramen were not usually well done. Van der Hoeve, several years ago, pointed out the necessity for a special technic. Roentgenologists are rather indifferent to the use of this technic, which is absolutely essential in order to fairly outline the optic foramen. Plates exposed in this way are more apt to show lines of fracture running off from the optic foramen than plates taken by the usual method. It is likely that in Dr. Reese's case an examination made by this method might have shown a line of fracture.

DR. ZENTMAYER stated that there are cases on record where this lesion produced blindness, but he was unable to state whether or not in connection with the amaurosis there were ocular palsies.

DR. WILLIAM M. SWEET said that in a number of cases examined some years ago by the roentgen rays, he had never been able to demonstrate a fracture thru the orbital foramen. He had seen two cases of blindness in both

eyes following concussion injury. In one an iron bar struck the side of the head, causing the man to fall and strike the other side of the head on a pile of iron; and the other a man who received a glancing blow on the front of the head from a mass of falling iron.

DR. REESE said that there were no ophthalmoscopic signs to account for the blindness. There was some fuzziness of the nerve and distention of the retinal veins. According to Parsons, hemorrhage into the nerve sheath plays a large part in injury to the nerve, V. Holder finding it in 42 out of 54 cases of fracture.

Macular Edema with Partial Separation of the Retina.

DR. LUTHER C. PETER presented a report of a physician, 66 years of age, who, about the middle of last October, noticed a blur before the left eye, the blurred area being definitely outlined and greenish in color. Objects were distorted. Vision rapidly fell from 6/5 to 6/15 on October 20th, 6/30 on October 26th, and 6/45 on November 4th. The patient described a definite, brownish, circular scotoma, which at first was of a greenish hue.

A careful physical and laboratory examination showed a negative Wassermann, normal blood chemistry, negative nasal sinuses, a normal urinalysis, blood pressure of 135 systolic and 85 diastolic and a cardiac condition which might be regarded as normal for a man of his age with a slight tendency to fibrosis. One tonsil showed a small pus pocket containing streptococci and staphylococci. There was a history of an old duodenal ulcer of many years ago. There had been no injury.

There was no evident macular disturbance with the usual ophthalmoscope. Examination with the simplified Gullstrand revealed a definite elevation of the macular region. The elevation was rounded and symmetric, and of the same color as the surrounding retina. The vessels were clearly seen to extend over the dome like elevation. The stereoscopic view afforded by the Gullstrand ophthalmoscope left no doubt as to the pathology. The border of the elevation was slightly pale, and a small patch of exu-

date was observed at the lower edge. Neither the Gullstrand nor the arc light and red free light gave the characteristic picture of the macula. With this lead it was possible by careful focusing to observe a difference of three diopters in the level of the small vessels at the top of the dome, and those of the surrounding retina.

At this time it was observed that with the addition of a +2.50 sphere the patient could read 6/7.5.

Altho laboratory and clinical tests were largely negative, the patient was treated with hot packs, eliminative treatment and rest. Ten days later, vision had improved slightly, and by means of the Gullstrand, it was observed that the upper part of the dome was depressed while the lower part was more bulging—the elevation being manifestly of a fluid character. This treatment was continued with slow, but steady improvement. At the last examination, Dec. 29th, 1925, a correction of +0.50 sph. \ominus +0.50 c. ax. 180° brought vision up to 6/6. At this examination the macular area could be seen emerging from the upper part of the swelling.

There manifestly was a partial separation of the retina from the choroid, and infiltration of the retina. The color and positive character of the scotoma, the distortion of objects, and the elevation of the entire macula, as shown by the refraction, as well as the early bladder like elevation seen, are all characteristic of retinal separation. The green vision and the positive character of the scotoma are symptoms which definitely differentiate the condition from a possible choroidal separation. The preservation of macular vision, altho somewhat lowered, must be explained by a nutritive supply which had not been completely cut off.

Green vision is a symptom to which our attention has been called as a forerunner of retinal detachment.

Of no less interest is the positive scotoma. In both editions of *The Principles and Practice of Perimetry*, Dr. Peter has stated that a positive scotoma may be produced by a cutting off of the nutritive supply of the outer neuron of the retina, i. e., the rods and cones, as well as by an interference

with rays of light in reaching the rods and cones, as by hemorrhage or exudate anterior to this layer of the retina. This statement has been questioned by some. The case under discussion is a concrete example of the formation of a positive scotoma by this means. The macula is elevated two and a half diopters, as shown by the refractive measurement of the elevation by means of the ophthalmoscope, and later by measurements of macular vision by lenses.

From an etiologic standpoint the case was also unusual. Tho there was little to explain the cause of the condition, it was probable that it was of cardiovascular origin. The gradual recovery and improvement observed under treatment suggested this.

Finally, it is interesting to note the value of the Gullstrand binocular ophthalmoscope in uncovering what was overlooked with the monocular ophthalmoscope. Binocular vision caused the lesion to stand out in relief.

Presentation of a Set of Couching Needles.

DR. HUNTER H. MCGUIRE presented to the Section a set of couching needles used by his grandfather, Dr. Hugh H. McGuire, in the performance of the cataract operation by the method in vogue during the early, and middle portion of the Nineteenth Century. This gift was accompanied by an historical sketch of Dr. Hugh H. McGuire of Winchester, Virginia, who attained a wide reputation as a surgeon and especially as an eye surgeon, thruout northern Virginia.

C. E. G. SHANNON, Clerk.

COLORADO OPHTHALMOLOGICAL SOCIETY.

February 20, 1926.

DR. C. E. SIDWELL, Presiding.

Episcleritis With Sclerosing Keratitis.

DR. W. A. SEDWICK showed Mrs. A S., 27 years of age, a housewife with one healthy child. There was no history of lues, no abnormality in the nose or throat and no pelvic disorders. In August, 1925, her left eye became inflamed and painful. A diagnosis of

conjunctivitis was made by the family physician. Following several days of no improvement, iritis was diagnosed. The eye showed periods of improvements and relapses for many weeks and was finally referred for a pterygium operation on Jan. 12, 1926. There was congestion and thickening of the conjunctiva and sclera, marked lachrimation and several rather prominent nodules extending from the limbus to the outer canthus, and downward and outward into the lower culdesac. A large red nodule occupied the sclero-corneal junction at "5 o'clock" and another of about the same size was situated in the sclera 4 mm. above the upper margin of the cornea. These nodules were painful and sensitive to the touch. There was an infiltration of the cornea from "3 to 5 o'clock". Numerous bad teeth were found. In spite of dental treatment, correction of diet, gastrointestinal asepsis and the administration of sodium salicylate and potassium iodid intravenously, the patient showed little improvement up to Feb. 17, 1926. However, three days later, the eye was nearly white and the nodules gone except the one at "5 o'clock". The adjacent cornea was infiltrated. The question arose whether this condition were tuberculous.

Discussion. DR. MELVILLE BLACK mentioned a case where a vaccine gave beneficial results.

DR. C. E. WALKER emphasized determining the location of the infecting focus and eradicating it.

DR. W. C. FINNOFF advised a Wassermann and study with the corneal microscope.

DR. W. H. CRISP thought that in tuberculous diseases of the conjunctiva and cornea or in phlyctenular keratoconjunctivitis, the synergistic action of the tubercle bacillus and other organisms such as occur in the chest should be considered.

DR. JOHN McCaw had recently made a diagnosis of tuberculosis in a patient with sclerosing keratitis who had an arrested pulmonary tuberculosis. The lesions entirely disappeared after calomel grains 1/10 was given three times a day.

DR. EDWARD JACKSON thought the lesions were too evanescent for tuberculosis.

Bilateral Metastatic Carcinoma of the Choroid.

DR. JAMES M. SHIELDS exhibited Mr. H. G. T., aged 70, who had consulted him because of blindness. Seven months ago, the patient weighed 180 pounds, the present weight was 154 pounds. Thoro physical examination revealed nothing pertinent to the ocular diagnosis. The roentgen ray impression, after roentgenograms of skull, sinuses and jaw, was a neoplasm, possibly a cyst in the middle fossa on the left side of the brain. Ocular examination revealed normal lids and corneae of both eyes. Pupils were a little sluggish to light. The lenses were clear but the vitreous bodies were filled with coarse floating shreds. In both eyegrounds the vessels had lost the normal light reflex and there had been a good deal of absorption of retinal pigment. Around the vessels much pigment had been piled up and in places the vessels had been almost hidden from view by this pigment. This was more noticeable in the right eye. The macular region of each eye was elevated owing to some choroidal abnormality. The prominences were both roughly triangular in shape with the apices toward the upper edge of the discs and the bases laterally placed. Both occupied the greater part of the posterior pole of the fundi. In each eye the upper and lower temporal vessels seemed to bound the detachment altho it extended a little beyond these limits in places. The edges of the detachment in the right eye were sharply demarcated from the surrounding retina except below, where the edge was not very distinct. In the left eye, the edges were not so sharply outlined as in the right. The entire elevation in the right eye was almost white except for small areas of hemorrhage at the lower apex. In the left, the elevated area was much grayer and contained a good deal of pigment. Both raised areas showed about four diopeters of elevation above the normal surrounding retinal areas.

Discussion. DR. W. H. CRISP said that these cases were thought to be rare but usually in the literature there were several reported yearly. The

retinal detachment was smooth and on a firm base.

DR. EDWARD JACKSON pointed out that in many cases of this type the carcinoma was frequently not diagnosed until seen in the eye and often not until necropsy. Carcinoma of the lung shows many symptoms but only one consistent symptom and that is loss of weight. The appearance of the lesions here was of white solid elevations and it was doubtful if the retina were detached because the edges were not abrupt.

DR. W. C. BANE said the retina was not detached but pushed forward by a growth.

DR. W. C. FINNOFF said that metastatic carcinomata of the choroid were flat and did not break thru the lamina vitrea. Sarcomata, however, broke thru quickly and detachment of the retina occurred early, most frequently at the posterior pole. Up to 1920 there had been 150 cases of metastatic carcinomata reported and there were probably many more unrecognized. In the past six months he has had from different confreres, three eyes with metastatic carcinoma in the uveal tract. One of these was in the iris, which is exceedingly rare. We can not always demonstrate the primary focus. He remembered one case in which at necropsy the primary focus was found in the spine.

DR. EDWARD JACKSON brought out that so called detachment of the retina was not a real detachment but merely a separation of two retinal layers and was significant of disturbance of retinal nutrition.

DR. MELVILLE BLACK reported the removal of an eye for glaucoma which had been previously seen by Dr. Finnoff who had made a diagnosis of tumor of the choroid. Recurrences had occurred in the orbit and two exposures of 11 hours each to 35 mg. of radium were made. At present there was absolutely no vestige of tumor cells in the orbit. All cilia had been destroyed by the radium and it was mentioned that one might employ this method in the treatment of trichiasis.

Iridocyclitis in One Eye; Anterior Capsular Opacity in the Other.

DR. W. H. CRISP presented a man, aged 32, seen for the first time on this day, who complained of rapid failure of vision of the right eye. The vision of the left eye had been very poor for a long time, and there was a vague history of disturbance of both eyes dating back ten years or more. After the meeting it was learned that both eyes had been under treatment five years earlier for choroiditis. The right eye had symptoms of iridocyclitis, including many folds in Bowman's membrane, many deposits on the anterior capsule, posterior synechias, and marked clouding of the vitreous. The fundus could not be seen. The left lens had an anterior capsular opacity of striking appearance, more or less stellate, or spider web shaped, with its center well above the center of the lens. The patient had been advised to have his tonsils out on account of apparent deep infection. Wassermann was reported negative.

Discussion. DR. W. C. FINNOFF thought the left eye especially interesting because it was the picture we frequently saw following trauma. He noted one fine vertical striation containing pigment. A cataract secondary to uveitis was generally diffuse and not circumscribed and confined to the anterior cortex as was this opacity.

DR. E. R. NEEPER mentioned a similar opacity resultant on the pulling loose of a posterior synechia.

DR. W. H. CRISP thought that if Dr. Finnoff's explanation were tenable the point of pigment would be outside the pupil. The lens opacity had by no means accounted for the loss of vision which was only light perception.

DR. EDWARD JACKSON mentioned a few cases of black cataract with doubtful light perception where a good result had followed extraction.

Repair of Postoperative Iris Hernia with Kalt Sutures.

DR. WM. C. BANE showed C. B. aged 66, who had developed a postoperative hernia extending from "12 to 3 o'clock" along the line of incision for senile cataract extraction of right eye. The iris had been forced into the

hernia and had become adherent. After waiting for the hernia to flatten out for a period of eight weeks, operative interference was decided upon Jan. 26, 1926. A large conjunctival flap was first prepared from the upper half of the globe. Two sutures were then passed from the cornea below the hernia into the sclera above it and left untied until the bleb was opened. The excess tissue was excised and the edges of the wound freshened, then the two deep sutures were tied bringing the wound margins firmly together. The conjunctival flap was then made to cover the cornea completely. The deep sutures were removed on the eighth day and corneal margins had been held firmly in position as sutured.

Following the operation for cataract extraction and also following the placing of the Kalt sutures, the patient was troubled with nausea and vomiting.

Discussion. DR. W. H. CRISP noted that the patient had had no breakfast prior to each operation and pointed out that all ill effects from homatropin and cocain in his hands had been when used on a patient with an empty stomach.

DR. MELVILLE BLACK thought that a conjunctival flap would have served the purpose as well as the Kalt sutures, which were extremely delicate and difficult to place.

DR. W. H. CRISP added that a conjunctival flap acted not only as a splint but afforded vascularity which promoted healing.

DR. J. M. SHIELDS, who had assisted at the operation, believed that the Kalt sutures in this case were a definite aid to coaptation of the wound margins.

Penetrating Injury of Globe with Unusual Visual Result.

DR. WM. M. BANE showed Mr. G. H. A., aged 34, who, on Sept. 10, 1924, had suffered a penetrating injury of the globe. The foreign body traversed the globe and lodged in the orbit. Vision at the time of injury was shadows. Five days later, sufficient absorption of a massive hemorrhage into the vitreous had occurred to permit vision of 5/60. On Sept. 29th, a small portion of the fundus was visible between the organizing blood clots in the vitreous.

On Oct. 28th, the vision remained 5/60 and a poor prognosis was given. In March, 1925, the patient reported improvement in vision and in May the same year was able to see pictures and persons indistinctly.

In July, 1925, a definite shrinkage of the organized exudate in the vitreous was noted and a good red reflex obtained. Vision was 5/20. On Feb. 20, 1926, the retina was clearly seen in places and the disc outlined thru the shreds of vitreous opacity which swayed back and forth with the movements of the eyeball. Vision was now 5/12 and the eye quiet.

Discussion. DR. W. C. FINNOFF said that in slight bleeding from the region of the ciliary body, the organization was apt to assume a fan shape.

Congenital Malformations.

DR. WILLIAM C. FINNOFF exhibited a girl, 4 years old, in whom there was displacement of the right eye temporalward so that the interpupillary distance measured 72 mm. A coloboma of the right upper lid in line with a furrow in the upper outer orbital margin suggested that these two defects might have been caused by pressure from the cord or amniotic bands in utero.

The hair of the right side of the scalp extended downward in a V-shape to meet the hair of the brow on the same side. The nose was bifid.

Discussion. DR. MELVILLE BLACK thought the cord theory was impossible and that the defects were of embryonic origin.

DONALD H. O'ROURKE,
Secretary.

ST. LOUIS OPHTHALMIC SOCIETY.

January 29, 1926.

DR. J. W. CHARLES, Presiding.

Some Aspects of Glaucoma.

DR. WM. F. HARDY read this paper.

Discussion. DR. JOHN GREEN, JR., said that a method of cataract extraction that prevents iris prolapse, anterior synechiae, incarceration of capsular shreds and cortical debris, would

rarely have as a sequel secondary glaucoma. In a recent series of seventy-five cases he has not had, to his knowledge, a single case of secondary glaucoma. He was inclined to think that this immunity is not accidental but resulted from certain safeguards routinely employed, namely: (1) preliminary iridectomy under a flap; (2) formation of a trapezoidal flap prior to section; (3) a "Verhoeff" stitch at the center of the upper border of the flap; (4) the largest possible capsulectomy; (5) free irrigation of the chamber after replacement and loose suturing of the flap; (6) additional conjunctival sutures at each upper angle of the trapezoid.

DR. W. H. HARDY in closing the discussion said that it was not his intention to bring out any discussion in regard to the treatment of these conditions, particularly that of glaucoma following cataract, but to get some enlightenment on the etiology.

Dr. Hardesty had asked about the possibility of protein sensitization. With the first case in the first eye he had the greatest trouble, but there was no protein sensitization. Preliminary iridectomy had been done, yet the eye went on to glaucoma. The remarks relative to protein sensitization could have been well applied to the second eye but the reaction was not nearly so severe as in the first.

Answering Dr. Luedde who took issue with the statement regarding the constancy of the size of the lens, Dr. Hardy said that the remark about the size of the lens being constant referred to normal individuals of a given age and that the lens continually grows in size from the time of birth till death, so that at the age of 75 it is actually one-third larger than at the age of 25. Taking a large number of healthy eyes of a given age the lenses are found to be quite constant in size, whether myopia, emmetropia, or hyperopia is present.

Glaucoma With a Deep Anterior Chamber in a Young Patient.

DR. N. R. DONNELL reported the case of Mrs. N. S., aged 31; housewife with four children, who was seen first in November 1920. One year previously

she had an attack of acute pain and inflammation in the left eye which was diagnosed and treated as glaucoma. Conservative measures only were used. Vision of the left eye gradually diminished up to the time of his examination. At this time she had a vision of 20/15 in the right eye, and light perception with poor projection in the left. Right eye showed no pathology. Left eye was slightly injected, lens partially cataractous obscuring the fundus and tension was high to fingers.

She was seen occasionally over a period of four years and continued comfortable altho the tension remained high. The iris became gradually atrophic, the sclera thin and ectatic at the limbus. A general physical examination was negative for disease. Nose, throat, sinuses and teeth were normal.

On Dec. 3, 1924, she came in complaining of great pain in the right eye. Examination revealed a vision in the right eye of 20/20. The eye was painful, injected and tension was 70 mm. Hg.; anterior chamber was of normal depth. Having before me the discouraging results of conservative methods as applied to the first eye, the patient was sent at once to the hospital where eserine $\frac{1}{2}\%$ and hot packs were used. After 24 hours there was no appreciable reduction of tension and no cessation of pain. Consultations with Drs. Lamb and Woodruff were held and it was decided to do a paracentesis emptying the anterior chamber and obtaining a temporary reduction of tension with the hope that the miotics would then act more efficiently. Following the paracentesis she had a complete cessation of all distressing symptoms; vision was improved for several days but tension gradually rose in spite of the treatment with rest, miotics and hot applications. On Dec. 13, 1924, tension was 44 mm. Hg.; four days later it was up to 51 mm. Hg. with increasing pain. The anterior chamber remained deep during this time and there were no deposits on the cornea at any time nor was the aqueous humor cloudy. The vitreous, however, was hazy.

On Dec. 31, 1924, an iridectomy was done thru a small corneal incision with a conjunctival flap; eye was bandaged and patient put back to bed. Follow-

ing this the pain promptly ceased. On the second day the eye was dressed and seemed to be doing well. She left the hospital in a week with eye quiet, tension normal to fingers and vision 10/200. One week later the eye was clear; tension was normal to fingers; media gradually cleared until some details of the fundus could be made out.

On March 18, 1925, the vision had improved to 20/20, tension continued down and the outlook seemed rather bright. I did not see the patient again until Apr. 9, 1925, which was three weeks later when the vision was reduced to fingers at 5 feet. There was no pain, no injection and no increase of tension but the lens was becoming cataractous. The vision continued to diminish and in a short time was lost, the eye behaving exactly as the previous eye.

Discussion. DR. E. H. HIGBEE said that Dr. Walter Parker in 1918 wrote an interesting article in the Transactions of the American Medical Association explaining why the anterior chamber is deep in some cases and why shallow in other cases. His theory is that the lymphatic circulation of the eye has a great deal to do with the cause of glaucoma. He classifies glaucoma of the noninflammatory type as simple anterior and simple posterior. Simple anterior is the type in which lymphatic drainage is interfered with in the fore part of the eye; simple posterior the type in which the interference is in the back part of the eye. His explanation is that when the chamber is deep the anterior lymphatic drainage is interfered with, forcing the lymph to flow backward thru the lymph spaces in the back portion of the eye, which causes the lens and iris to fall backwards. When the anterior chamber is shallow, blocking in the posterior lymph channels forces the lymph to flow forward, and produces a shallow anterior chamber. His suggestion is that those cases with posterior type do better under iridectomy as the anterior spaces are not involved; the lymph can flow thru the normal front canals. In cases in which the anterior chamber is shallow then sclerotomy is preferable because the channels in the posterior part of the eye are blocked, and need more drainage, altho he pre-

fers trephining in all cases where the fields are reduced to 20 to 30 degrees.

DR. JOHN GREEN asked if the tension remained up after the iridectomy.

DR. DONNELL replied that it remained under 30, but it never came down to normal.

DR. GREEN replied that he would have been inclined, in that case, to do an iridotaxis from one angle of the coloboma. In one of his patients with secondary glaucoma, iridectomy failed to reduce the tension below 35; after iridotaxis tension fell to 15.

DR. J. W. CHARLES said that in listening to Dr. Higbee's reading he was reminded of his early experience at the clinic of some of the reports which came out of glaucoma in cases of retinitis pigmentosa. It was stated that particles of migrating pigment were deposited on the fibers of the ligamentum pectinatum in some of those cases, causing glaucoma. It happened that at the time he read those reports, twenty years ago, he had one case of retinitis pigmentosa and glaucoma which had continued for several years, and this glaucoma was with a shallow anterior chamber. He also had a microscopic specimen of glaucoma and retinitis pigmentosa at the same time, in a slide which he exhibited that had a shallow anterior chamber, with plenty of pigment deposited in the spaces of Fontana. It seemed an anomaly after reading Dr. Parker's classification. Of course, one might say that pigment might also have been deposited around the venae vorticosae and also in the lymph channels in the optic nerve. As he remembered he saw nothing around the optic nerve.

DR. N. R. DONNELL closing the discussion said that in reply to Dr. Ewing's question regarding tuberculosis, he was never at any time able to make an intraocular examination in the primary eye. Extraocularly, there was nothing which pointed to tuberculosis. In the second eye which subsequently became involved, up to the onset of the attack of glaucoma, he had made a number of examinations but could find no pathology.

Mikulicz's Disease.

DR. J. F. HARDESTY read a paper on this subject and Dr. H. D. Lamb re-

ported on the pathologic anatomy of the case, to be published in full in an early issue.

CHARLES W. TOOKER, Editor.

MEDICAL SOCIETY OF THE DISTRICT OF COLUMBIA.

Section on Ophthalmology and Otolaryngology.

March 10, 1926.

DR. WM. T. DAVIS, Chairman.

The Scientific Program was furnished by Dr. William H. Wilmer and his Staff from the Wilmer Ophthalmological Institute.

Radium in Ophthalmology.

DR. LAURA LANE said the use of radium in benign lesions of the eye and adnexa is not as well known as its use in malignant conditions. Only two percent of ophthalmologists have used radium in eye lesions.

Radium emits three types of rays: alpha, beta, and gamma. Of these, beta and gamma, especially gamma are used in treating lesions of interest to the eye, ear and throat specialist.

All the rays produce secondary rays and have an ionization effect. This is important in treatment of the eye as changes which may prove harmful can take place in the vitreous and aqueous. These harmful rays are eliminated by proper screening.

Radium has its greatest effect on tissue containing many undifferentiated immature cells, in tumors with great vascularity and tissue with lack of stroma or intercellular substance.

The following eye lesions have responded to radium therapy: Angioma, epithelioma, benign growths, blastomycosis marginalis, blepharospasm, lupus and exanthoma of the lids.

Radium is a specific in vernal conjunctivitis, and gives promise of aid in carcinoma, pterygium, trachoma, pemphigus and other conjunctival lesions.

In ulcers of the cornea, leucoma, keratoconus, interstitial keratitis, and tuberculous and trachomatous disease of the cornea radium is of great benefit.

Tuberculous lesions of sclera and iris also respond well to radium.

The Antigenic Properties of Lens Protein.

DR. WOODS gave a short preliminary report on the work on lens protein now being done in the Wilmer Institute. He reported that they had thus far been able to isolate two substances from lens protein which appear to be entirely different in their immunological reactions. These substances were termed the alpha and beta fractions, according to the nomenclature of Hektoen. The albuminoid fraction described by Hektoen and his co-workers appears to be identical with the alpha fraction. The preparation of these fractions in other conditions is very difficult. The question of the proper preparations of the substances appears to be related to their P. H. From the small evidence available it seems that the experiments of Guyer and Smith would be fully substantiated.

Treatment of Glaucoma Simplex.

DR. LEO J. GOLDBACH said that corneoscleral trephining is the operation of choice for glaucoma in the Wilmer Ophthalmic Institute. About 8 mm. above the limbus a wide thick conjunctival flap is begun; nearing the limbus the corneal layers are carefully dissected. A 2 mm. trephine is used cutting thru the cornea first. The bulging iris is cut. The conjunctiva is sutured with interrupted cat gut. Atropin 1% is instilled into the eye daily. Argyrol 10% and boric acid irrigations are used daily.

Obstruction of Central Artery of Retina with Presence of a Cilioretinal Artery.

DR. C. A. CLAPP said obstruction of the central artery of the retina was first diagnosed clinically by von Graefe in 1859, and Schweiger confirmed the diagnosis microscopically five years later.

Whether the cause is an endarteritis with thrombosis or embolism, has been discussed pro and con and in all probability cannot be determined by the ophthalmoscopic picture, but if there is a history of previous attacks of dim vision and especially if arteriosclerosis of the vessels is present, then it may be assumed that the condition is endarte-

ritis with thrombosis; on the other hand if physical examination reveals endocarditis and there have been no premonitory symptoms, and the blindness has occurred very suddenly, we may assume the lesion is embolic in origin.

Coats in 1905 could find but twenty-four cases studied microscopically; some of these being thrombotic, some embolic and in some obstruction was found.

The reports showing the presence of a cilioretinal vessel are very rare, and altho Kapauner in 1917 reports twenty-one cases in which six showed a cilioretinal vessel, this seems to be a very high proportion.

Nearly all reported cases showing a cilioretinal vessel, describe it as extending nearly to the macula, and the vision retained is usually far from normal.

The patient reported showed a typical picture of obstruction of the central artery of the retina with a cilioretinal vessel coming out from the temporal margin, extending towards the center of nerve and then bending sharply and proceeding outward above the macula, being crossed by several small vessels of the central system. The line of demarcation between normal and edematous retina was very abrupt with considerable difference in level. This wedge shaped area of normal retina was sharply outlined above and below but blended with the edematous retina at the temporal side. His vision with correction was 20/30—. Physical examination showed marked cardiac hypertrophy with a pronounced systolic murmur.

The Pathology of Choroiditis and Retinitis in Syphilitic Infants.

DR. JONAS S. FRIEDENWALD said that practically nothing has, up to now, been known concerning the ocular pathology of fetal syphilis. Two cases are reported showing lesions that are clearly syphilitic.

Case 1—Diffuse infiltration of the choroid with myeloid cells. Hemorrhage into choroid and under retina.

Case 2—Marked interstitial fibrosis of choroid with infiltration of choriocapillaris. Flat detachment of retina. Destruction of anterior layers of the

retina and their replacement by granulation tissue. Destruction optic nerve with overgrowth of glia and connective tissue. Infiltration of retina, choroid and optic nerve with myeloid cells.

A full report of this study will appear in the Johns Hopkins Hospital Bulletin.

Enucleation with Endogenous Cartilage Implantation.

DR. CECIL H. BAGLEY said that approximately five centimeters of cartilage of the sixth rib is removed. This cartilage is chosen to prevent any deformity as the ribs in this region are joined together by a cartilaginous anastomosis at the costal margin. The eye is enucleated in the usual manner, and a cartilaginous ball is constructed from the graft as large as can be inserted into Tenon's capsule. The four recti muscles are sutured together over the cartilage in a crucial fashion. Tenon's capsule is closed with a purse string No. 1 catgut suture. The conjunctiva is closed with interrupted fine black silk. The conjunctival sacs are filled with 1-10,000 bichlorid salve and a dressing applied to both eyes.

JAMES N. GREER, JR., M. D.
Secretary.

BROOKLYN OPHTHALMOLOGICAL SOCIETY.

February 18, 1926.

DR. RALPH I. LLOYD, Presiding.

Pulsating Exophthalmos.

DR. JOHN EVANS read a paper on this subject, which will be published in full.

Routine Examination of Ocular Muscles.

DR. CONRAD BERENS emphasized the following points. Routine examination of ocular muscles is feasible in clinic practice if there is a sufficient number of medical and lay assistants. In clinical examinations the screen and parallax tests for 6 m. and for 25 cm., and the determination of the near points of convergence and accommodation will serve for detection of muscle imbalance. These tests may be done in less than a minute and are sufficient for practical purposes. A form for recording examinations has some dis-

advantages, but the advantages, namely, aid to memory, uniformity in recording results, and a fixed position for certain findings, outweigh its disadvantages. In office practice, it is important to make a routine muscle examination before using a cycloplegic or prescribing lenses. In some instances proper diagnosis and treatment of muscle imbalance will render the use of lenses unnecessary. Again, if lenses are required, the patient may not feel the constant need for them. Further, when lenses must be worn constantly, exercises will frequently add greatly to the ocular comfort of the patient and may prevent the rapid onset of fatigue. After lenses are prescribed they should be carefully checked as to centering and grinding by the ophthalmologist and the muscle balance and near points of accommodation should be restudied and recorded in the proper place on the card. Methods for testing ocular fatigue are of value and should be used routinely in the study of patients complaining of asthenopic symptoms. An ophthalmic ergograph is valuable but not indispensable in making a diagnosis of ocular fatigue. Muscle exercises have been found of value in disorders of convergence, divergence and supravergence. They should be ordered before prisms are used, except in cases of supravergence. When converging exercises are ordered care should be used that they are not carried to excess and an esophoria produced. The value of exercises for insufficient accommodation has not as yet been established. Muscle exercises are of help in some cases in which no refractive error or muscle imbalance can be demonstrated. These are probably cases in which the onset of fatigue is delayed by proper exercise.

Radiology and Its Relationship to Ophthalmology.

DR. RICHARD RENDICH showed a series of roentgen ray plates demonstrating sinus conditions, foreign bodies in the orbit and globe, the various types of optic canals, changes brought about by disease of the pituitary gland and other pictures of interest to the ophthalmologist.

WM. F. C. STEINBUGLER, Sec'y.

OMAHA AND COUNCIL BLUFFS OPHTHALMOLOGICAL AND OTOLARYNGOLOGICAL SOCIETY.

March 17, 1926.

DR. S. D. MAIDEN, Presiding.

Recent Advances in Ophthalmic Therapeutics.

DR. HARRY S. GRADLE of Chicago, guest of the Society, delivered a paper on the use of adrenalin in glaucoma, the use of afenil in vernal catarrh, mercurochrome in conjunctivitis and chronic dacryocystitis, also his technic in giving milk injections for their non-specific protein reaction.

Congenital Aniridia.

DR. SANFORD GIFFORD presented the case of Miss K., aged 34, who was first seen July 15, 1924. At this time the vision in the right eye was 20/100; left eye 4/200. There was no sign of an iris to be seen in either eye. Both lenses showed peculiar opacities in the anterior and posterior cortex. The patient stated that vision had failed rapidly during the last year, especially in the left eye. A history of similar conditions in the family was given. One sister, one half-sister, one half-brother, and one niece are affected by the same condition. The patient returned to her home with the advice to await development of the cataract in the left eye before operation. She returned Feb. 22, 1926, with a vision of light perception in the left eye. Good projection was present. A discission was done, at which time a large amount of milky cortex escaped leaving a round, hard nucleus floating in the anterior chamber. No vitreous was lost. A rise of tension followed the discission necessitating two punctures of the anterior chamber after which the eye became quiet. At present it is quiet and a good view of the fundus can be seen over the nucleus which is gradually absorbing. An attempt will be made to break up the nucleus with two needles.

Essential Atrophy of Iris Associated with Glaucoma.

DR. SANFORD GIFFORD also presented the case of Mrs. H., aged 42, who was first seen in 1922 at which time vision

was normal with correction in each eye. Two years later she returned and at this time the right pupil was drawn up and in, so that its upper border was invisible. The lower part of the iris showed a dark sector in which the stroma was almost completely atrophic but the pigment epithelium could be seen. Tension was: right 23, left 20. In spite of the use of eserine the tension in the right eye gradually increased. A trephining was done at the upper limbus by Dr. Harold Gifford but in spite of this the tension increased again. A second trephining at the lower limbus done in November 1925, has kept the tension well within normal limits since. Vision is now 20/50 with correction. The atrophy of the lower sector of the iris gradually progressed, until now not even the pigment epithelium is present and a plain view of the fundus can be obtained thru the atrophic area.

SANFORD GIFFORD, Secretary.

April 14, 1926.

DR. S. D. MAIDEN, Presiding.

Operative Treatment of Congenital Cataract.

DR. F. W. DEAN operates by discission which is followed in from three to four days by removal of the soft cortical matter by means of a modified suction apparatus. All possible soft cortical matter is removed in this operation after which no further operative interference is usually necessary. Four cases were shown on whom this procedure had been carried out with excellent visual and cosmetic results. In one, the other eye had been treated by repeated discissions elsewhere with a resulting iris prolapse and irregular pupil.

Modification of Tendon Tucking.

DR. DEAN demonstrated with lantern pictures, an operation designed to reduce the amount of protrusion occurring immediately after the operation due to the hump of muscle and also to give additional security to the tuck. After the tuck has been completed according to the Valk-Banister technic, one end of the hump is cut and the muscle folded back and secured by two additional chromic catgut sutures.

SANFORD GIFFORD, Secretary.

NASHVILLE ACADEMY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY.

April, 1926.

DR. E. L. ROBERTS, Chairman.

Melanotic Sarcoma of Choroid, Spindle Cell Variety.

DR. HILLIARD WOOD reported the case of O. B. T., aged 36, who was first seen June 16, 1926. There was failing vision in the right eye for past three or four months, worse in the last week. There was no pain, no tonsillitis; some rheumatism several years ago. R. E. V. = 20/30, plus 0.50 D. S. V. = 20/25. L. E. V. = 20/15, accepts no lens. R. E. tension 18 mm. of mercury. Right eye. Pupil dilated with homatropin. Pupil dilates normally. General fundus best seen without lens. Vitreous clear. Fundus seen perfectly. Detachment of retina situated in the middle line below. Detachment begins about 45° below the optic disc, is then ballooned upward and extends forward apparently to about the ciliary processes. Laterally, the detachment extends from about 4 o'clock to 8 o'clock. Detachment is pale gray color, without fluctuations or corrugations; with little or no fluctuation when the eye moves. Blood vessels can easily be traced all over the detachment, and do not show undulations. By transillumination the pupil looks red when the light is placed over any part of the eye, except below, from 4 o'clock to 8 o'clock, where it is dark.

The next day the tension of the right eye was 17 mm. of mercury. Transillumination showed a definite shadow over the retinal detachment when the light was slightly dimmed.

Dr. Robert Sullivan finds that transillumination does not produce any definite shadow and thinks the detachment is probably serous. Advised patient to wait two weeks and return for reexamination.

The question is, whether the de-

tachment is caused by serum or a tumor, probably sarcoma. In favor of the idea that the detachment is caused by serum are the following: Detachment is below, has gray color, not pigmented; no increase of tension; and Dr. Robert Sullivan thinks that it is probably serous.

In favor of the diagnosis of intraocular tumor may be mentioned the following: Detached retina is smooth, not folded or fluted; does not fluctuate with the motion of the eye, and there is a relative, if not a positive shadow by transillumination, especially when the light is dimmed.

Dec. 22, 1925. R. E. Since June vision has gradually failed until now the eye has only P. L. For the past week the eye has been painful and red.

R. E. V. = P. L. L. E. V. = 20/15, accepts no lens.

Right eye. Marked conjunctival injection. Pupil moderately dilated. Long axis vertical, dark; virtually no fundus reflex.

By transillumination a dim reflex everywhere, except from 4 to 8 o'clock, where there is positive umbra. Urine shows albumin plus 1. Tension of right eye 68½.

Probable diagnosis: Intraocular tumor.

Right eye. Operation at St. Thomas' Hospital under cocain-novocain anesthesia. Did simple enucleation of right eyeball. Did not find any macroscopic disease about the back of the eyeball or orbit. The eye was turned over to Dr. Buist Litterer for examination.

Dr. Litterer's report. Right eyeball. Eyeball normal in size. Cut surface anteroposteriorly, shows a definite tumor extending from the ciliary processes to the optic nerve posteriorly. This mass measures 10x3 mm. Pale, brownish gray, and moderately firm. Cut surface thru this mass is grayish brown. Diagnosis: Melanotic sarcoma of spindle cell variety.

R. J. WARNER, Secretary.

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JEAN MATTESON, ROOM 1209, 7 West Madison Street, Chicago, Ill.

LATE RESULTS OF INTRACAPSULAR EXTRACTION OF CATARACT.

The removal of the opaque crystalline lens in its capsule has been done widely, in the hope that an operation, admittedly more difficult and open to certain special dangers, would yield better visual results, with less chance of subsequent impairment produced by opacities developed on the capsule. The immediate results in favorable cases have been reported as strikingly good. But in India the general custom of patients traveling long distances to certain centers for the cataract operation, and quickly dispersing over a wide region with poor facilities for communication after the operation, prevented any good understanding of the ultimate fate of these cases.

In 1908, the late Dr. D. W. Greene, of Dayton, Ohio, collected about 70 of the cases he had operated on by the Smith-Indian method, for inspection by Dr. Casey Wood and the writer. These cases had been operated on from a few days to many months previously. The wide coloboma and drawing up of the iris, and the rather large proportion of eyes not entirely free from hyperemia and undue sensitiveness to light, after several weeks, made a rather unfavorable impression. This impression was not removed by the

statistics of cases operated on in America, by Col. Henry Smith and Prof. I. Barraquer; altho a later study of cases operated on by Col. Smith in Chicago, published by Dr. W. A. Fisher, made a more favorable showing.

The American operators who have had much experience of intracapsular operations, have devoted a good deal of attention to changing the technic of the operation; and have followed the example of publishing statistics of large numbers of early results, rather than the later histories of a few cases, carefully followed up thru longer periods of observation. The few cases that have done badly, and subsequently have consulted other ophthalmologists, have increased the doubt and skepticism current with regard to the ultimate results of these operations. However, in the Transactions of the Ophthalmological Society of the United Kingdom (Vol. 45, p. 117) Dr. Arnold Knapp has published the paper presented at the London Convention of English Speaking Ophthalmological Societies a year ago; which is of real value in forming a judgment of this method of cataract extraction.

The experience on which his paper was based includes 200 cases, that had been operated on between 6 and 16 years before. He could give the results

as to vision and changes in the eyeball in 85 of these cases. There were 16 patients who had died, who all seemed to have retained good vision to the end. There were 57 whose vision was found to be as good as it was soon after the operation, or improved. He states: "There is no question that the vitreous is much more free from opacities in these cases than in the capsulotomy cases. This is to be expected by the greater freedom from iridocyclitis and the absence of reaction, which sometimes follows the dissection. No changes were found in the deeper vitreous layers with the slitlamp, other than those described by Vogt as senile." Knapp also quotes from papers by Munoz Urra and Elschnig (*Amer. Jour. Ophth.*, 1925, v. 8, p. 355).

Among unfavorable conditions sometimes following cataract extraction, Knapp mentions a patient who came back six years after the extraction with heterochromic iritis, optic atrophy and glaucoma, conditions not very rare in old people who have not had cataract. Of three cases with chronic glaucoma and cataract, two had the glaucomatous tension relieved by the operation; and in one a secondary operation was required for that purpose. There was no case of detached retina in his series. In two old and feeble patients, the cornea became clouded by corneal sclerosis, and in one patient there was corneal dystrophy.

On the whole, the late results in Knapp's series would be counted good, for any form of cataract extraction. The operation he did was a conservative form of intracapsular extraction; subluxating the lens by grasping the capsule as low as possible, with blunt forceps; and desisting from the attempt if there was much resistance. He finds this technic can be carried thru successfully in 40 or 45 per cent of cases; eyes with glaucoma yielding easily to this procedure. E. J.

OPTOMETRY.

Optometry, "Measurement of the powers of vision in general, as acuteness of perception of form and color, or the extent of the field; more nar-

rowly, measurement of the range of vision," is the definition given in the *Standard Dictionary*, written by some one who was thinking of it as a department of science, or an art. "The employment of any means other than the use of drugs, for the measurement of the powers of vision and the adaptation of lenses for the aid thereof," is the definition in the *New York law*, written by some one who had in mind to raise fitting glasses to the legal status of a profession.

The development of a profession is a long slow process. Over four thousand years ago, when the code of Khammurabi was written on the clay tablets of Babylonia, the medical profession had grown into the social life of the people until it had a definite legal status. It has consisted from that time of a definite body of men, possessing an ever growing mass of information, to which any member of the profession might and many did contribute, with recognized responsibilities and duties, to all human beings; with standards of learning and ideals of ethics, ever becoming better understood and more widely sustained.

A profession can be recognized in law, but not created by it. The fiat of a state legislature is no substitute for knowledge, trained skill and fellowship born of mutual understanding. It does not awaken the sense of broad responsibility to the public and one's profession, which is the essential spirit of a profession as distinguished from a business. Mechanical skill, business energy, neatness, good salesmanship are all good things; but they do not create a profession. If there is developing a profession of optometry its progress will be known by the development of common aims, common ideals looking to the public good, common standards of education and service, a keener appreciation of responsibility to the public, better education of those who enter its ranks; and not success in manipulating legislation, or raising money to advertise its claims in the press and by radio.

What is being done by education to build up a profession of optometry? This is a larger undertaking than may have been realized even by those en-

gaged in it. Certainly most of those who thought optometry offered a short cut to all that was desirable about a "learned profession," or even the members of the medical profession who undertook "measurement of the powers of vision in general" have not fully understood what was to be learned in preparation for such service. Columbia University, the first to offer opportunities for the study of optometry apart from medicine, devotes its Bulletin of Information for April 24, 1926, to "Professional Courses in Optometry." This gives an interesting account of what has been done up to this time and the plans for progress in the near future, that can be read with profit by anyone interested in the optometry side of ophthalmology.

Columbia has given a two year course, requiring for admission the same standard as for its general freshman year in its arts department. To men and women with this high school preparation, it has taught physics and optometry. Under physics (400 hours) it includes optics; and under optometry (950 hours) elementary mathematics, anatomy and physiology of the eye (lectures, demonstrations, and dissections) and pathologic conditions of the eye (35 hours) and conservation of vision (17 hours). The faculty teaching these branches includes a professor holding the degree of Ph.D., two holding the degree of A.M. and seven instructors one of whom is an M.D. This course leads to no degree but to a certificate of graduation. It will be continued at least until 1928-1929. It would be interesting to know how many men and women have taken it, as compared with the "optometrists" of the country who have degrees from nonresident diploma mills, and the number who have made pretence of trying to take "professional courses" elsewhere.

In 1930 the State of New York will require for a license to practice optometry a degree either of Bachelor of Arts, or Bachelor of Science "and a certificate of graduation from a registered school of optometry." To prepare for this situation Columbia will

put in operation a four years course. Students completing this new course will receive both the degree of Bachelor of Science and a certificate of graduation in optometry.

Not the least suggestive part of this Bulletin is a notice of the new Physics building erected by Columbia University to be occupied this year. Of this twelve story edifice "The entire eleventh floor has been set apart for laboratory instruction in optics and optometry and for the offices of some of the teachers in these special subjects. One large room for examination of eyes will contain at least twelve separate compartments, each completely furnished and equipped with the best and most modern appliances for thoroly testing the eyesight. Thus as many as twelve pairs of students at a time can be at work in this room under the supervision of one or more instructors. On two afternoons each week, from 2 to 6 o'clock, thruout the entire year, this Optometrical Laboratory is open. By making an appointment in advance anyone can come here on these days and have his eyes examined, without charge, first by the students themselves and afterwards by instructors who are licensed optometrists, and will give the patient the proper prescription."

We have quoted at length what ought to be very interesting to all who are trying to teach ophthalmology, or to preside over institutions devoted to teaching medicine in all its branches; or to those who are only seeking the best education in ophthalmology for themselves. It is an important part of the business of every officer of administration in a university to keep himself in touch with what is being done in rival institutions. Even in war the intelligence service is one of the most important branches of the army, an understanding of the plans of the enemy is an extremely important part of military preparedness. Let those who are going to carry forward the development of medicine learn all they can about the plans of optometrists, and then do their own planning.

E. J.

BOOK NOTICES.

Mikroskopische Anatomie der Regenbogenhaut. M. Wolfrum, Prof. in Leipzig. Paper, octavo, 218 pages, 58 illustrations, 25 in colors. Berlin: Julius Springer, 1926.

The Graefe-Saemisch Handbook is the greatest collection in the world of Monographs relating to Ophthalmology. This is part of the second edition, edited by Axenfeld and Elschnig; and is designated as Part I, Volume I, Division 2, Chapter 3; being the part of the chapter devoted to the iris. The whole chapter deals with the microscopic anatomy of the uveal tract, other parts to be written by Prof. H. Lauber of Vienna. It is also designated as "lieferung" or numbers 488 to 490. In view of this extremely complicated systematic arrangement, the simple things to remember are; that this monograph is by Wolfrum, and on the microscopic anatomy of the iris, and that it is the most complete treatise on its subject.

Wolfrum describes his book as divided into three parts. The first part (50 pages) gives the anatomy of the iris as it appears under the simple microscope, or loupe, magnified up to 10 or 15 diameters. The anterior layer is studied during life, in ordinary clinical work. The posterior layer is seen only after death, or removal of tissue by iridectomy. The second part (30 pages) considers the microscopic and topographic relations of the structures seen in single sections of the iris. The third part brings out the finer histologic relations of the iris structure, and their analogies to such relations of other parts of the body. Each part is abundantly illustrated.

There is a bibliography of the literature, chronologically arranged, which illustrates the striking increase of interest in this subject. It begins with the work of Riolan in 1626. From the first two centuries come 10 titles. From 1826 to 1876 there are 29 titles and from the last fifty years more than 250 titles, altho only 11 came from the five year period of the great war. Only thru such a monograph as this of Wolfrum, can the valuable contents of the literature relating to such a sub-

ject be made available to the mass of readers.

Biomicroscopy is carrying over into clinical ophthalmology much of what knowledge of the structure of the iris has been accumulated in the last three centuries. The foundation for all practical knowledge of pathologic changes in the iris is laid in acquaintance with that of the normal conditions. Familiarity with normal appearances furnishes the background, against which departures from the normal become significant.

E. J.

Erholungsfähigkeit der Netzhaut nach Unterbrechungen der Blutzirkulation. Dr. Gustav Guist. Paper, octavo, 124 illustrations in the text and two plates in colors. Berlin, S. Karger, 1926.

The publisher of the Zeitschrift für Augenheilkunde issues this as one of a series of monographs edited by C. Behr of Hamburg and J. Meller of Vienna. It is somewhat similar to the series issued in connection with the British Journal of Ophthalmology, which includes the monograph of R. Foster Moore on the allied subject of Retinal Venous Obstruction (See Amer. Jour., 1925, v. 8, p. 253).

The work of Foster Moore had a strictly clinical basis. This one by Guist, on the possibilities of recovery of the retina after interruption of the circulation of blood in it, puts the questions involved to the test of experiment. It gives 27 pages to a review of the recorded clinical cases, of complete or partial recovery of retinal function, after obstruction of the retinal circulation; and then takes up the results of the experimental work done by others and the discussion of methods of experiment. The remainder of the book is devoted to Guist's own experiments and results.

The animal chosen by Guist for this work was the rat; both because of similarities between its retina and the human retina, and because the interruption of the ocular circulation could be most completely and easily accomplished in the rat, with the least permanent damage to the eyeball and related

parts. By pressure on the lids the eyeball was dislocated forward; and an elastic ligature made to include conjunctiva, muscles, optic and other nerves, and the blood vessels, in such a way as to suspend completely the intraocular circulation. The interruption could be kept up any desired length of time; and then the ligature removed and the blood allowed to flow freely into the vessels again. The eye could be examined with the ophthalmoscope as often as desirable, or excised for fixing and histologic study.

In repeated experiments Guist interrupted the circulation of blood in the eye completely, for periods ranging from five minutes to one and a half hours. He concludes that in the higher vertebrates, as in man, the complete suspension of the circulation for about 15 minutes, sometimes more sometimes less, arrests the nutritive processes in the retina, so that degeneration sets in.

E. J.

A Manual of Normal Physical Signs.

Wyndham B. Blanton, M. A., M. D.,
Richmond, Va. Cloth, 12mo. 215
pages. St. Louis. The C. V. Mosby
Co. 1926.

A young man, elected county treasurer, asked a banker how he could detect counterfeit money. The reply was: "Learn what good money is and you will know bad money as soon as you see it." The signs of disease are always recognized by their departure from the signs of health. No progress can be made in physical diagnosis of disease, until we know what the normal body reveals to our methods of examination. Blanton points out: "In the textbooks of physical diagnosis normal signs are so intermingled with pathologic signs that the average beginner in this subject finds himself hopelessly at sea in attempting to discover a clear description of just the normal. This brief compilation of normal findings in the healthy individual is assembled primarily to aid such students."

The book gives a synopsis of what to search for, leaving the student, by actual practice on his own and other normal bodies (the only way possible)

to gain a real acquaintance with this basis of all physical diagnosis.

The eye receives due consideration in this "skeletal arrangement." In the chapter on Inspection two pages are devoted to it. Under Palpation "what to feel for," ciliary tenderness, tension of globe, and presence of tumors near it, are mentioned. Under blood vessels it is stated: "The visual inspection of arteries can be well carried out in the oculi fundi. Ophthalmoscopic examination is of more value than feeling the pulse. The eyegrounds are the only places in the body where one sees arteries face to face, as it were. Here we can see whether walls are thickened, calcified, tortuous, broken, etc." In the chapter on Nervous System, normal conditions of vision and motility of the eyeball are considered.

On page 42 under "Oculi fundi" occurs this line: "Importance of this examination?" What is said elsewhere in the book shows its author appreciates the importance of ophthalmoscopic diagnosis; and Loring wrote: "Five-sixths of the art of ophthalmoscopy is acquaintance with the normal fundus." Probably the "?" refers to the advisability of the undergraduate student trying to become familiar with the normal eyeground. Many medical schools take that view. However, the schools that teach every student to recognize the general features of the ophthalmoscopic image, find this teaching most inspiring to their students; and the exact conceptions they get by sight, make their knowledge of general pathology more concrete and definite in certain directions, as angiosclerosis, hemorrhage, etc., than what they can get in any other way.

The book is one that will perform well an important function in the undergraduate teaching of medicine.

E. J.

Chininum Scriptones Collectae, 1924.

Edited and published by the Bureau for Increasing the Use of Quinin. Cloth, octavo, 264 pages, 34 plates, 1 map and illustrations in the text. Amsterdam, 1925.

This book, with its Latin title-page and its origin in Holland, is printed in

English. Probably its sponsors believe that thru this language it will get the widest attention from those who may become recruits for the world war against malaria, which goes on under the sanction and active cooperation of the League of Nations. The interested munition makers, the producers of quinin, from the Dutch East Indies, conduct a campaign of propaganda; supplying news of the conflict that should be as interesting to the physician as any about gas bombs or aviation.

The success of the first volume of collected writings on quinin (See *Amer. Jour. Ophth.*, 1925, v. 8, p. 418) has stimulated the issuing of a second; accompanied by a card asking for copies of published papers regarding the use of the alkaloids of cinchona, in any branch of medical practice. This volume contains nothing especially relating to ophthalmology. The longest article in it gives an account of the journey of the Malaria Commission of the League of Nations, to Eastern Europe and Italy, illustrated by 22 plates reproducing scenes encountered. There is also a history of the activities of the League regarding malaria.

These volumes have a good deal of value as medical history. Battista Grassi has written on results of the antimalarial fight in consequence of the discovery of the malaria carrying anopheles. There is a fine photographic portrait of Grassi, who died recently; and similar portraits of Alphonse Laveran, and Sir Ronald Ross. There is also an interesting collection, 12 plates, of posters used in different parts of the world in the education of the public with regard to malaria and the anopheles. In this collection, India, the Dutch East Indies, Algeria, France, Roumania, Russia and the United States are represented.

We sometimes think Americans know all there is worth knowing about advertising. But for the highest grade of such propaganda, that which is of most permanent value to the public as well as the advertiser, we have something to learn from the Dutch.

E. J.

CORRESPONDENCE.

Oil Injections in Treating Lacrimal Stenosis.

To the Editor:

In the April issue of A. J. O., Dr. E. C. Ellett reports an unfortunate complication from an oil injection in a patient who came to him from a physician whose name he does not mention altho it is his case record that Ellett quotes. This is in comment on my clinical note in your February issue.

Apparently in Ellett's case a false passage had been made thru the fascia lacrimalis over the tear sac, and the oil injected about the orbicularis oculi. When the swelling was noted in the lower lid the physician attempted to massage it back thru the point of entrance, but only succeeded in spreading the oil thru the lower and part of the upper lids. He then applied hot compresses. Heat renders mineral oils more fluid and diffusible.

It resulted in a smooth firm swelling, somewhat discolored, in both lids. Dr. Ellett states: "She underwent seven or eight rather extensive operations, the first to remove the 'paraffinoma' and the others to overcome the deformity caused by the injection and the attempts to remove the mass. Her final condition is not cosmetically perfect."

The case record states: "The treatment was continued for a dozen times after this and at no time did such an accident happen again; the tearing (epiphora) continued to lessen and now she has dry eyes."

When I first read Dr. Ellett's report I was inclined to doubt whether this was a paraffinoma as the only ones I had seen had been the result of paraffin with a melting point above 104° F. However, in reading the literature I find that Mook and Wander reported in the Archives of Dermatology and Syphilology for March 1920 a series of camphor oil tumors in patients who had received injections of adulterated oil, where the officinal olive oil had been replaced by paraffin oil. In these cases no ill effect occurred until some months later when a "disturbance in the circulatory equilibrium caused a granulomatous reaction to set in."

J. H. Stokes of the Mayo Clinic in

the Archives of Dermatology and Syphilology for July 1921, also reported a case where the injection of adulterated camphor oil in the arm was followed by a latent period of eighteen months, when a fresh injury became infected and a granuloma occurred in the epitrochlear lymph glands.

B. F. Davis—Journal A. M. A. Dec. 18, 1920, says: "Paraffinoma is produced by prolonged continuous exposure of susceptible tissues to the irritation of paraffin as a low grade chemical irritant."

Moure and Brindel in using paraffin injections inside the nasal cavity found some danger of producing thrombophlebitis of the facial vein.

In Ellett's case the swelling apparently appeared instantly after the injection of a few drops of oil. Probably a false passage thru the lacrimal fascia was made, an event which I warned against in my clinical note. But paraffinomas do not develop rapidly.

Possibly it would be safer to use olive oil or castor oil for those lubricating injections, as it would eliminate all danger of paraffinoma.

Dr. Ellett's case was cured of her epiphora and stenosis by the oil injections so it seems to me we should not so willingly condemn them without trial as a therapeutic resource; for, as Prof. Fuchs says, of these cases, "permanent cures form the exception."

GEORGE M. McBEAN.

Chicago, Illinois.

Misleading Statements.

To the Editor: Enclosed you will find a copy of a letter which I have just written to the Professional Press, Chi-

cago, and which is largely selfexplanatory. In the interest of right, I wish you would give that letter, as well as this, early publication in the "American Journal of Ophthalmology."

Very fraternally yours,

T. H. SHASTID.

COPY.

The Professional Press, Inc.,
17 North Wabash Ave.,
Chicago, Illinois.

Gentlemen:

In your "Blue Book" for 1926, I have just noticed, with much amazement, the unwarranted insertion of my name as that of an optometrist, also as that of a member of the "Kindly Optical Co.," of this city. "Kindly" I take to be a mistake for "Kindy," as there is no "Kindly Optical Co." here. Inasmuch as I have never in my life been an optometrist or a member of the Kindy, or any other, optical co., I take it much amiss that you should thus have inserted my name, or have inserted it at all, without the slightest warrant on my part for so doing.

I also notice, in the same edition of your "Blue Book," that, in the "Alphabetical Index," p. 434, you have "Shastiel, T. H., Superior, Wis." As there is no person by the name of "Shastiel" in this city, I take it that "Shastiel, T. H." is intended for "Shastid, T. H."

Tho I have no quarrel with optometrists or opticians, I will thank you to leave my name out of your "Blue Book" hereafter, further not to represent me at any time as being a member of a business firm in which I have never had the slightest interest, financial or other.

Yours truly,

T. H. SHASTID.

Superior, Wisconsin.

ABSTRACT DEPARTMENT

Reprints and journal articles to be abstracted should be sent to Dr. Lawrence T. Post, 520 Metropolitan Building, St. Louis, Mo. Only important papers will be used in this department, others of interest will be noticed in the Ophthalmic Year Book.

Schiötz, Ingolf. Results of Holth's Tangential Sclerotomy in Glaucoma. Norsk. Mag. f. Laegevidensk., vol. 86, pp. 1202-08.

This operation was first devised in 1920. During the last few years it has been used more than any other operative method for glaucoma in Rikshospital at Oslo, and the results are very carefully reviewed by Dr. Schiötz. The operation had been performed 272 times; in simple glaucoma 228; secondary glaucoma 23; inflammatory glaucoma 10; infantile glaucoma 11. No selection of cases had been made, but Holth's operation had usually been substituted in cases in which Elliot's trephine would otherwise have been used.

Results as to tension in simple glaucoma are tabulated as follows:

1. Tension measured (Schiötz tonometer) at time of discharge from hospital, 228 eyes; 186, or over 80%, showed a tension of from 21 mm. to 6 mm. which is considered satisfactory; of these 119, or 52% of the total, had an ideal tension of from 18 mm. to 12 mm. In 22 the tension was higher than 21 mm.; and in 20 lower than 5 mm., 7 of these being quite soft.

2. Tension measured from one to four years after operation, 82 eyes: 63, or 77% showed a tension of from 21 mm. to 6 mm.; of these 44, or 53% of the total, had a tension of 18 mm. to 12 mm. In 10 the pressure was higher than 21 mm. and in 9 below 5 mm.

Complications noted were:

1. Hemorrhage from iris or ciliary body, quite marked in 24 eyes, but without any serious results; no expulsive hemorrhage in any case.

2. Mild iritis appeared to be about as common as after Elliot's operation (as shown by previous statistics from this same hospital), for of 129 cases examined, 22 showed large synechiae and 72 small synechiae.

3. No late infection was reported in any case. This, Holth thinks, is explained by the fact that the scleral

fistula lies farther from the limbus than in any other method of operation and is thus covered by a thicker conjunctiva.

No statistics as to vision or as to fields were given.

In infantile, inflammatory, and secondary glaucoma the results were not particularly striking excepting, however, in those cases of secondary glaucoma due to a noninflammatory cause, such as contusion, in which the method seemed very favorable.

The results in simple glaucoma seemed to be so favorable that the reviewer unhesitatingly recommends Holth's tangential sclerotomy as the operation of choice.

D. L. T.

Gjessing, Harold G. A. Results of Holth's Iridodencleisis for Glaucoma. Norsk. Mag. f. Laegevidensk., vol. 86, pp. 1208-11.

The author has performed this operation 89 times, and reports the end results in 79 eyes based on examinations conducted from 8 to 116 months after operation. In only 6 cases were the examinations done a shorter time after operation than one year. The findings were as follows:

1. Preoperative visual acuity was retained or increased in 86% of the eyes.

2. Maintained or increased visual fields were found in 82%.

3. Normal tension was secured in 82%. In no case was it subnormal, i.e., below 12 mm.

He favors this operation for glaucoma for the following reasons:

1. The results are uniformly good.
2. The risk is relatively small because—

- a—There is no thin walled bleb.

- b—The ciliary body is never injured.

- c—No subnormal tension follows it.

3. The cosmetic result is fine. The pupil is dislocated very little and no dazzling occurs.

D. L. T.

Meisling, Aage A. Color Sense and Color Sense Tests. Abstract of a paper read at the sixth Scandinavian Ophthalmological Congress at Copenhagen, July 1, 1926.

In order to determine how the true red-blind and green-blind would perceive the usually applied color tests (Holmgren, Krenchel, Daa, and others), solutions of light green and erythrosin were employed. The former dye stuff excludes nearly all the red rays, the latter the majority of the green. The results of these tests showed that it is comparatively easy, by means of color filters to make the examiner red-blind, red being confused with and identical with brown, grey and black, and purple with blue. It was far more difficult to produce a state of green-blindness by means of the tests used, the result being highly dependent on the spectral composition of color tests, which varied from sample to sample. In order to estimate the applicability of a test color its spectral composition should, therefore, be examined with a special view to the secondary colors, which by the color-blind—in contradistinction to the normal—are utilized for discrimination between the test object as a color-blind person will be guided by the color tone and by the brightness of the secondary colors.

In order to create rational tests for color-blindness, we have the alternatives of selecting the test objects according to their spectral composition, or on their two or three color print. The latter is rendered possible by the lithographic color tests (Ishihara's, Stillings's), where the colors are appropriately selected. In some previous experiments with combination of color filters, erythrosin and methylene blue-gelatin, the author pointed out that, looking thru these compound filters, a person with normal color vision sees in the same way as the color-blind, since he can perceive the figures and windings on Ishihara's tests for color-blindness which are otherwise perceived by the color-blind alone. This is due to the fact that the combination of filters excludes nearly all other color rays but blue. The color-blind

person is thus able to read the tests only on account of his perception of blue and because he sees purple as blue; this can further be proved by photographing the plates on silver bromid films, which are sensitive to blue only, and on which, consequently, the same figures and windings as are perceived by the color-blind will appear.

To explain the color sense, two theories seem possible:

1. The presence of color filters in the retina which intensify certain colors and efface others, thus lending to colored objects a highly varying degree of brightness. We may here point to the colored oil globules, which are situated immediately in front of the cones in birds and reptiles. The light must necessarily be filtered thru these before reaching the external part of the cone. These globules are ruby, yellow and greenish in the retina of hens. (Some preparations were demonstrated by the lecturer).

2. Sensitization of the retina with color sensitive substances similar to the method of sensitizing films by silver bromid to red, yellow and green by means of dye stuffs, such as cyanin, eosin, and erythrosin, etc.

Against this sensitization theory the objection has been made that, apart from the retinal purple which sensitizes to green and blue, no color substances have been found in the retina; this objection is, however, greatly weakened by the fact that it has been established by photographic experiments that silver bromid can be rendered photosensitive to red, yellow, and green, by addition of quite minimal quantities of dye stuffs, so minimal as to be invisible to the eye. For example, by applying eosin, in a dilution of one to one million, a silver bromid film will be rendered sensitive to yellow.

That colors may appear to become less intense when an object has been viewed for a lengthened period also seems to indicate a consumption of visual substances in the retina.

In this connection a case described by Prof. A. Lehman, where a color-blind (green blind) person states that

he has temporarily regained normal vision, possibly in association with a mussel poisoning, may be of some interest. The patient writes: "Before I realized my trouble, I had wondered that two colors which to me appeared to be highly different, were by others designated as green. Later, I understood that of a yellow-green color I perceived an impure yellow, and of a bluish-green I perceived an impure blue, while I failed to recognize the pure green. This will also explain why to my eye, the colors of a wood in springtime and of one fading in autumn have quite the same character, while people with a normal color vision tell me that there is a huge difference. On one single occasion I believe, however, that I have experienced color sensations which were identical with those of a normal person, but as far as I am aware, this experience lasted only for one day. It was a December evening in 1901 that as I was sitting in my room, my eyes happened to glance at a colored map of Copenhagen hanging on the wall of my room; I was startled at perceiving a color in the part representing Frederiksberg Gardens (a park in Copenhagen), which I had never seen before. I realized at once that it must be an intensely green color. Quite amazed I gazed about me, detecting everywhere red and green colors of a character quite unknown to me and in places where I had never previously perceived any colors at all, thus for instance in puddles of water in the street (it was the time of sunset) and in lighted windows. Highly excited at this discovery, I went out into the street in order to gather new impressions and, altho it was at the point of getting dark, I enjoyed the sight of colors everywhere, in places where I never expected them, especially red and green colors. Quite by chance I met Prof. Lehman to whom I at once communicated my experience. He would not believe me, at first, but took me to a grocer's shop window in order to test me, as he knew exactly my color mistakes and confusions. On this occasion, however, to his great surprise,

he did not succeed in detecting my mistakes. I was able to name exactly each special color, myself wondering that colors could produce such varying sensations on the eye, which was something quite new to me. We made an appointment for the next day that Prof. Lehman might undertake a more thoro examination of my color sense; but alas, already on the next day the spell was broken, and I have never since regained this power."

As a result of the above mentioned investigations, the author states his view that color perception possibly depends on the presence of certain substances in the retina.

From what has been said and particularly because of the case referred to in which a green blind person temporarily had normal color vision, it would seem that there is a possibility of curing color-blindness by subcutaneous injections of dilute solutions of dyes which would be bound by the retina and make it sensitive to colors.

D. L. T.

Vincent, Cl. Two Cases of Transient Amaurosis in Epidemic Encephalitis. Soc. de Neurol., March 4, 1926. Abst. Gaz. des Hôp., 1926, v. 99, p. 419.

The first patient, aged 55, became suddenly blind, with no fundal lesion and no change in the pupillary reactions. This finally completely disappeared. The second patient, a woman of twenty-nine, gradually became blind, also without fundal lesions or change in pupillary reactions. The blindness was accompanied by fever, after the disappearance of which the sight returned.

C. L.

Bourguignon, G. and Dejean, R. Double Chronaxia of the Optic System in Man. Soc. de Biol., March 20, 1926. Abst. Gaz. des Hôp., 1926, v. 99, p. 466.

The authors found that there was a chronaxia corresponding to a stimulation of the periphery of the retina, which yielded a phosphene located at the periphery. Another, which corresponded to stimulation of the fovea, yielded a phosphene located at the center.

C. L.

Bourguignon, G. and Dejean, R. Local and Distant Phosphenes. Soc. de Biol., March 20, 1926. Abst. Gaz. des Hôp., 1926, v. 99, p. 466.

When the electrode is near the papilla, the phosphene appears in the diametrically opposed part of the eye. On the other hand, when the electrode is far away from the papilla, the phosphene appears under the electrode. The chronaxia is the same for local as for distant phosphene. Its value depends only on the peripheral or central localization of the phosphene. The different optic neurones are therefore isochronic normally, but not in a pathologic state. C. L.

Zirm, E. Anterior External Sclerotomy in Glaucoma. Klin. M. f. Augenh., 1925, Nov.-Dec., 1925, p. 725.

Five cases are reported. After formation of a conjunctival flap, the sclera at the limbus is incised with von Graefe's knife from outside in interruptions, to make an irregular section. The incision, 15 mm. long, penetrates the whole sclera only in the center, at the ends only the external and intermediate strata. After an iridectomy, the conjunctival flap is replaced and fixed by fine sutures. The irregular incision is intended for an irregular scar with formation of tissue between the edges, in order to increase the expansibility of the sclera. The results were good in four cases, in which the speedy restoration of the anterior chamber was remarkable. C. Z.

Kraupa, E. The Genesis and Literature of Vascular Proliferations of the Vitreous in Lues and Arteriosclerosis. Klin. M. f. Augenh., 1925, Nov.-Dec. 75, p. 711.

Kraupa describes vascular nets and veils growing into the vitreous from the vessels of the disc, fluctuating on movements of the eye. They occur in the second stage of lues, others are due to arteriosclerosis, possibly also luetic. In two cases antisiphilitic treatment improved vision to 6/12. C. Z.

Usher, C. H. Frequency of Metastatic Carcinoma of the Choroid. Brit. J. Ophth., 1926, April, v. 10, No. 4.

According to investigations of lifetime, metastatic carcinoma of the choroid is of infrequent occurrence. About 109 are reported including the author's two cases. One, a female, aged 47 years, with cancer of the breast, developed metastatic growths in both eyes four years later. The second was a female, aged 42 years, who had had a cancer of the breast removed two years previously. Death occurred six months later. D. F. H.

Felix, C. H. Crossed Quadrant Hemianopsia. Brit. J. Ophth., 1926, April, v. 10, No. 4.

The author reports a third case to the two known in literature. A man, aged 63 years, suffering from arteriosclerosis and degeneration of the heart, suddenly became totally blind. After a few days his vision improved and he was able to see objects as in a mist. He was very calm but conscious and had cerebral symptoms. Four months later his health and vision improved, he was carefully examined, with correction V. 6/8 and 6/12. The discs were normal. The fields revealed crossed quadrant hemianopsia with sparing of the macula. This latter fact militates against the presence of the lesions in the optic tract. The author suggests that a small thrombus not closing the vessel, is formed just on the place where both deep cerebral arteries arise from the basilar artery. This thrombus has then been divided in two parts which are carried by the blood stream to the calcarine arteries.

We have here a case of crossed quadrant hemianopsia starting from a double sided homonymous hemianopsia with probable sparing of the maculae in a patient who showed no other cerebral symptom. This makes the case more remarkable than the two other reported cases. It seems to be unique. D. F. H.

NEWS ITEMS

Personals and items of interest should be sent to Dr. Melville Black, 424 Metropolitan Building, Denver, Colorado. They should be sent in by the 25th of the month. The following gentlemen have consented to supply news from their respective sections: Dr. H. Alexander Brown, San Francisco; Dr. Wm. Thornwall Davis, Washington; Dr. Gaylord C. Hall, Louisville, Ky.; Dr. George F. Keiper, LaFayette, Indiana; Dr. J. W. Kimberlin, Kansas City, Mo.; Dr. George H. Kress, Los Angeles; Dr. Edward D. LeCompte, Salt Lake City; Dr. W. H. Lowell, Boston; Dr. G. Oram Ring, Philadelphia; Dr. Charles P. Small, Chicago; Dr. G. McD. VanPoole, Honolulu.

DEATHS.

Dr. Alexander Duane of New York City, American translator and editor of Fuchs' textbook, died June 10th.

Dr. E. Parks Hall of Kansas City, died May 17th, after an illness of several months.

SOCIETIES.

Dr. J. W. May, the retiring president of the Kansas City Eye, Ear, Nose and Throat Society, entertained the members at dinner May 20th, at his home. There were about fifty guests. Dr. Jabez N. Jackson, president-elect of the American Medical Association was a guest of honor.

The Oxford Ophthalmological Congress will meet at Keble College, Oxford, England, July 15th-17th; on Thursday the discussion will be on "Sympathetic Ophthalmia"; Friday the Doane Memorial Lecture will be delivered by Dr. Thomas Henderson on the "Anatomy and Physiology of Accommodation in Mamalia." An afternoon will be devoted to demonstrations in the scientific and commercial museums.

The Pacific Coast Oto-Ophthalmological Society met in San Francisco on April 26-27-28 with a registered attendance of one hundred and forty-six. Dr. Edward Jackson of Denver was the guest of honor; other guests being Drs. Thomas H. Halstead of Syracuse, New York; H. P. Mosher of Boston, Massachusetts; Robert C. Lynch of New Orleans, Louisiana; Wm. P. Wherry of Omaha, Nebraska; Thomas E. Carmody of Denver, Colorado; Carl Beck of Chicago, Illinois; Burt R. Shurly, of Detroit, Michigan and Ray Lyman Wilbur, president of Stanford University. Spokane, Washington, was chosen for the 1927 meeting, and Dr. Carroll Smith of that city was elected president.

The final meeting, until next fall, of the Ophthalmological and Oto-Laryngological Section of the Cleveland Academy of Medicine was held at Hotel Winton, Friday evening, April 23rd, 1926. The program of the evening consisted of a symposium on the subject of "Industrial Ophthalmology." Those who contributed to the program were Dr. A. D. Ruedemann who spoke on "The Eye Hazards and Safety Measures Employed in their Reduction;" Dr. Webb P. Chamberlain who reviewed "The Management of the Traumatic Eye;" Dr. Paul Moore who discussed "Industrial Compensation for Ocular Injuries and Methods Employed in Computing Amount of Disability;" and the final speaker, Dr. W. C.

Hill, who took up "The Localization of Foreign Bodies by X-Ray." The various papers proved highly instructive and interesting and elicited a great deal of valuable discussion. Dr. R. B. Metz presented a case of "Coloboma of the Iris and Choroid" seen by him in the Ophthalmological service at Lakeside Hospital Dispensary.

The joint meeting of the Sioux Valley Eye and Ear Academy with the Omaha and Council Bluffs, and the Kansas City Societies was held in Omaha on February 8th. In the morning an operative clinic was held by Dr. John M. Wheeler of New York City at the University Hospital. Cases operated on included a contracted orbit, congenital ptosis, converging strabismus, ectropion, immature cataract, and glaucoma. In the afternoon the meeting was held at St. Joseph's Hospital, Drs. J. L. Myers and T. S. Blakesley of Kansas City delivering a joint paper on the "Use of Diathermy in Eye, Ear, Nose and Throat Work." Discussion was opened on this by Dr. Albert Tyler of Omaha. A diagnostic clinic was conducted at which the following cases were presented. Dr. O'Brien discussed a case of complete third nerve paralysis (patient of Dr. Swab). Dr. H. B. Lemere presented a case of marked esophoria after a tenotomy operation had been performed. The case was discussed by Drs. O'Brien and Banister. A joint banquet of the above societies with the Midwest Section of the Triological Society was held at the Fontenelle Hotel in the evening following the clinic. Dr. Louis Bushman, president of the Sioux Valley Eye and Ear Academy, presided.

PERSONAL.

Dr. Burton Chance, Philadelphia, announces the removal of his office to 315 S. 15th Street.

Dr. Frank Allport of Chicago, was a San Francisco visitor during the early part of May.

Dr. G. Henry Mundt of Chicago, has been elected president of the Illinois State Medical Society.

Dr. Albert LeMoine of Kansas City has been appointed as chief state consultant to the Missouri Blind Association.

Dr. S. Dace McPherson, Durham, North Carolina, announces the opening of a private hospital for the treatment of eye, ear, nose and throat cases.

Dr. M. W. Jacoby, Cleveland, Ohio, departed recently for Boston, where he will be engaged in postgraduate study in Ophthalmology.

Dr. John E. Weeks is expected to return to New York, June 1st, after having spent the winter in California and Oregon.

Dr. H. L. Sloan of Charlotte, N. C., has been appointed ophthalmologist to the Charlotte Eye, Ear, Nose and Throat Hospital.

Dr. John A. Donovan of Butte, Montana, was elected chairman of the section of Ophthalmology of the American Medical Association at the Dallas meeting.

Dr. M. Uribe Troncoso has been appointed full Professor of Ophthalmology in the Post Graduate Medical School and Hospital, New York City, in place of Dr. A. Edward Davis, retiring for age limit.

Dr. A. Yribarren of Buenos Aires, Argentina, was the guest of the Spanish-American Medical Society on April 22nd last, when he read a paper on the "Suture of the Cornea, as a Routine Method after Cataract."

Dr. W. E. Bruner attended the Ohio State Medical Association meeting held at Toledo, May 11th-12th, where he contributed a paper to the ophthalmologic and otolaryngologic section on "Intraspinal Injections for Optic Atrophy of Luetic Origin."

MISCELLANEOUS.

The Brooklyn Home for the Blind received \$500 by the will of Catherine Donigan.

The New York Association for the Blind received \$2,632 by the will of Cora C. Withers.

Five hundred and thirty-eight eyes were lost in the state of Pennsylvania last year thru accidents.

The Industrial Home for the Blind, New York, received \$5,000 thru the will of the late J. Adolph Mollenhauer of Brooklyn.

The International Sunshine Society, Inc., a newspaper club, desires to locate blind babies and young blind children, in order to secure a law that will provide care for them. Persons who know of such blind babies are requested to communicate with Mrs. John Alden, 96 Fifth Avenue, New York.

The next examination of the American Board of Ophthalmic Examinations will be held in Denver, September 13th, just before the meeting of the Academy of Ophthalmology and Otolaryngology, which convenes at Colorado Springs, September 14th. Further information may be obtained from the secretary of the board, Dr. William H. Wilder, 122 South Michigan Avenue, Chicago.

"Our Own and Our Cousins' Eyes" is the title of an article appearing in the April number of the American Journal of Physiological Optics. This little story is a gem and should be read by everyone. The author, Dr. Thomas Hall Shastid, formerly of Superior, Wisconsin, is now a resident of Duluth, Minnesota.

On April 24th a delegation of ophthalmologists and others left for Oklahoma to inspect Indian reservations in an effort to check the ravages of trachoma. The delegation included Dr. B. F. Royer, medical director for the National Committee for the Prevention of Blindness; Dr. Arthur M. Yudkin, Yale University School of Medicine; Dr. William H. Wilder, Chicago, and Dr. Thomas B. Hollaway of Philadelphia.

Thru the efforts of the National Committee for the Prevention of Blindness, a course for the training of teachers for sight saving classes will open June 21st at the University of Cincinnati and continue for six weeks. There are 242 sight saving classes in operation in different parts of the United States. The object of these classes is to properly educate children who have seriously defective vision and who need special educational facilities. Lack of teachers is said to be the principal difficulty in the way of establishing sight saving classes.

The National Committee for the Prevention of Blindness announces that the Leslie Dana Medal for the greatest achievement in the prevention of blindness and the saving of sight will be awarded to Miss Louisa Lee Schuyler of New York. Miss Schuyler is said to have been personally responsible for the founding of the National Committee for the Prevention of Blindness. Last year the Dana Medal was awarded to Dr. Edward Jackson of Denver "for outstanding achievement in the organization of instruction in ophthalmologic and medical colleges and for his contribution to the literature of ophthalmology."

The Blind Relief Association of India, with headquarters at 65 Kalbadevi Road, Bombay, has sent out an appeal, with descriptive literature, for assistance in maintaining its work, the field of which has become so extended that available funds are far from adequate to finance even a small part of the work. The report emphasizes the large number of the blind in India whose condition could easily have been prevented by the proper measures, and the necessity of reaching the vast numbers of the poor, the ignorant and the superstitious thru popular education in personal hygiene, as well as thru medical and surgical relief.

Current Literature

These are the titles of papers bearing on ophthalmology. They are given in English, some modified to indicate more clearly their subjects. They are grouped under appropriate heads, and in each group arranged alphabetically, usually by the author's name in *heavy-faced type*. The abbreviations means: (Ill.) illustrated; (Pl.) plates; (Col. Pl.) colored plates. Abst. shows it is an abstract of the original article. (Bibl.) means bibliography and (Dis.) discussion published with a paper.

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